

CHAPTER 11

COMMUNITY DISASTER RECOVERY

This chapter defines disaster recovery in terms of its distinctive activities and explains how it differs from activities that take place during other phases of the emergency management cycle. The chapter begins with a brief description of the routine functioning of US communities and then turns to the housing, economic, and psychological recovery of households and the operational recovery of businesses. The chapter then turns to the recovery assistance that can be expected from state and federal government and from insurance. The chapter concludes with a discussion of local government's preimpact recovery planning and the implementation and improvisation of that plan during a disaster's aftermath.

The Routine Functioning of US Communities

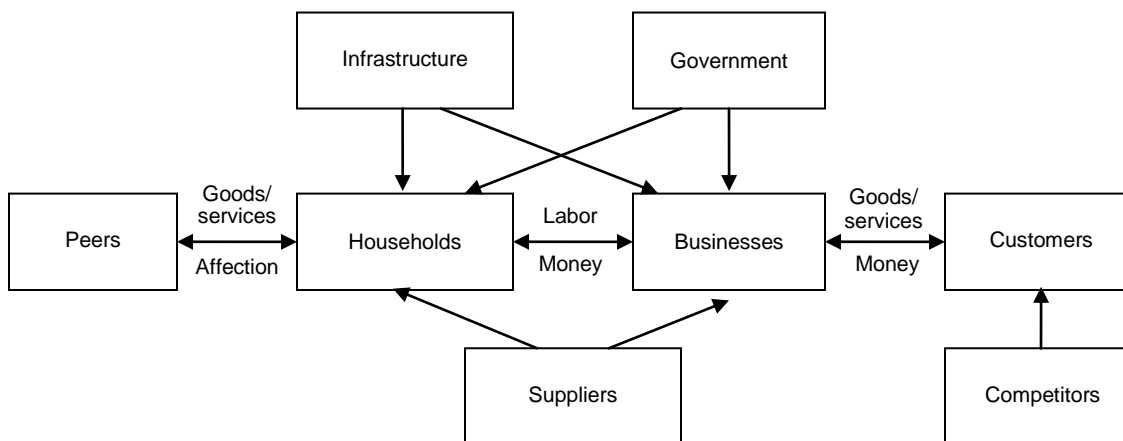
The process of community recovery from disaster cannot be properly understood without understanding how communities function before a disaster strikes. First, a *community* is commonly understood to be a specific geographic area and is frequently considered to be equivalent to a political jurisdiction such as a town, city, or county. However, a community also has two additional elements—psychological ties and social interaction (Poplin, 1972). Psychological ties involve a sense of shared identity that arises from common goals, values, and behavioral norms (shared expectations of appropriate behavior) that lead “insiders” to distinguish themselves from “outsiders” (Lindell & Perry, 2004). Moreover, insiders interact with each other more frequently with each other than they do with outsiders and these interactions involve differentiated roles (e.g., parent-child, supplier-customer, citizen-bureaucrat) that involve the exchange of resources. Communities are ecological networks (Bates & Pelanda, 1994; Peacock & Ragsdale, 1997) in which the basic types of units are households, businesses, and government agencies. Each social unit has people (family members in the case of households and employees in the case of businesses and government agencies) and resources. As Figure 11-1 indicates, households supply labor to businesses in exchange for money. In turn, households pay money to obtain goods and services from private suppliers (ranging from grocers to doctors), infrastructure (water, sewer, electric power, fuel, transportation, telecommunications), and government services (e.g., fire protection, education, parks). In addition to these economic exchanges, households engage in behavioral interaction with peers such as friend, relatives, neighbors, and coworkers. These exchanges sometimes involve goods and services, but they are more frequently characterized by exchanges of affection and emotional support.

Businesses use the labor they receive from households to produce goods or services, which they then sell (to the degree they are more successful than their competitors) to their customers. As is the case with households, businesses use the money they obtain from customers to pay suppliers, infrastructure, and government. (For-profit) businesses provide goods and services for a fee and government provides them in exchange for taxes. However, there are also (nonprofit) NGOs that provide goods and services at or below cost—and sometimes free. For example, Habitat for Humanity relies substantially on donated materials and volunteer labor to construct affordable housing. The American Red Cross and other NGOs use donated money, goods, and services to provide shelter, food, clothing, medicine, and financial grants to those in distress. The steady flow of money in exchange for goods and services, known as *cash flow*, is critically important to social units that have insufficient savings.

In a free market economy, government establishes broad rules within which individual parties can freely establish contracts for the exchange of resources. For example, government declares certain goods (e.g., heroin) and services (e.g., prostitution) to be unacceptable and, therefore, illegal. It also requires private parties to undertake certain activities (e.g., obtain a license to practice medicine; provide an

accurate accounting and annual statement of corporate assets) and provides some services that the private sector cannot or will not otherwise provide at acceptable cost (e.g., rural electrification, routine mail delivery). It is important to recognize that the units in the community network differ in their resources and, thus, their power. Thus, units with more social, economic, and political power can force less powerful units to accept less favorable outcomes.

Figure 11-1. Routine Relationships Among Social Units.



Moreover, these basic community units act in cooperation, competition, and conflict (Poplin, 1972; Thomas, 1992). *Cooperation* refers to activities that result in mutual benefit. A prime economic example is a business relationship in which a supplier provides a good or service to a customer in exchange for money. *Competition* exists when two parties strive toward a goal that only one can achieve. In fair competition, the parties abide by methods of goal achievement that are mutually accepted as legitimate. For example, two businesses compete to sell a product to customers on the basis of quality and price. *Conflict* occurs when one party attempts to directly frustrate the goal achievement of another. For example, one business might attempt to use its greater resources to force its suppliers to refuse to serve its competitor. There are many social institutions, such as schools and churches, that seek to promote agreement on basic values and legitimate methods of goal achievement by socializing their members. Complete consensus is never reached, so political institutions exist to resolve differences and to provide an authoritative allocation of public resources.

Within each of these three categories, social units vary in their assets. Households, businesses, and government agencies have *human assets* such as cognitive, psychomotor, physical abilities, and personality characteristics which, together with their time and effort, constitute what economists consider to be *labor* (Schneider & Schmitt, 1986). In addition, they have *physical assets* such as land, buildings, equipment, furniture, clothes, vehicles, crops, and animals, which economists classify as *goods*. Finally, they have *financial (capital) assets* such as cash, stocks, bonds, savings, insurance. In many cases, these assets were accumulated by incurring *financial liabilities* such as loans, mortgages, and credit card debt. However, the assets they have accumulated generate *income* from employment, rental of physical assets, interest or dividends from financial assets. (Of course, government derives most of its income from taxes.) This income must be balanced against expenses for *consumption* (e.g., households' purchases of shelter, food, clothing, medical care, entertainment and other goods and services), and *production* (e.g., businesses' and government agencies' payments for raw materials, infrastructure, and employees' labor),

as well as *investment* in additional assets (e.g., training/education to increase human assets, equipment to provide more efficient production). Finally, social units vary in the amounts of resources they possess. As noted in Chapter 6, households with certain demographic characteristics such as ethnic minorities, aged, and female-headed status frequently have fewer resources. Similarly, small businesses (i.e., those with few employees) and small local jurisdictions (i.e., those with small tax revenues) also have fewer resources. This makes it difficult for them to withstand an extended disruption of the community system that is, as Chapter 6 indicated, precisely what a major disaster produces.

Household Activities

Households engage in a variety of activities over the course of the day and the amount of time spent in different activities can be described in term of their *time budgets*. Table 11-1 reports the results of a recent time budget study conducted by Wiley, et al. (1991). The table lists 26 different categories of activities that were combined from a larger list of nearly 100. The activities are listed in terms of their population means (averages) for minutes per day. Some activities are performed by all people (e.g., sleeping) whereas others are performed by only a small part of the population (e.g., singing and dancing), so the mean number of minutes per day is listed separately for the entire population and doers (i.e., those who engage in the activity).

Table 11-1. Community Residents' Activities.

Activity	Population mean (min)	Doer mean (min)*	Activity	Population mean (min)	Doer mean (min)*
Sleeping	504	506	Child care	18	79
Working	194	424	Active sports	16	88
Electronic media	143	184	Outdoor recreation	11	134
Travel	109	118	Cultural events	10	143
Eating	89	93	Errands	8	41
Socializing	56	115	Car repair	6	48
Personal care	50	58	Hobbies	5	114
Reading/writing	48	104	Bars/lounges	4	101
Education	46	237	Animal care	3	33
Cooking	38	73	Singing/dancing	3	106
House cleaning	34	87	Other	2	29
Shopping	25	66	Dry cleaners	1	73
Yard work	20	111	Services	1	83

Adapted from Wiley, et al. (1991).

These time budget data reveal two significant aspects of people's daily activities. First, some activities such as sleeping and eating are essential, as indicated by small differences between population means and doer means. By contrast, other activities such as cultural events and singing/dancing are highly discretionary, as indicated by large differences between population means and doer means. Discretionary activities can be substantially reduced or eliminated when the need arises. Second, some of the activities with large differences between population means and doer means arise from the household division of labor in which some activities are age or gender stereotyped. For example, adult males are more likely to be the household members involved in yard work and car repair, whereas adult females are more likely to be the ones involved in shopping and child care. In recent years, it is increasingly likely for both adult males and females to be involved in work outside the home. However, children of both genders participate in education. As will be seen later, households attempt to maintain their normal patterns of

daily activities in the face of disasters—especially what are considered to be the most essential activities—as well as household members’ division of labor in performing those activities.

Business Activities

The businesses in most towns and cities produce a wide variety of goods and services. The Bureau of the Census devised the North American Industry Classification System (NAICS, revised in 2002), which was formerly known as the Standard Industrial Classification (SIC). NAICS categorizes all businesses into 20 industries and assigns a numerical code to each. Table 11-2 shows the two digit codes for these industries, but this is a very coarse grouping. These broad industrial classes are divided into finer categories that are identified by six digit codes (see www.census.gov/epcd/naics02/).

Table 11-2. North American Industry Classification System (2002).

Code	Activity	Code	Activity
11	Agriculture, Forestry, Fishing & Hunting	53	Real Estate & Rental & Leasing
21	Mining	54	Professional, Scientific, and Technical Services
22	Utilities	55	Management of Companies and Enterprises
23	Construction	56	Administrative and Support and Waste Management and Remediation Services
31-33	Manufacturing	61	Educational Services
42	Wholesale Trade	62	Health Care and Social Assistance
44-45	Retail Trade	71	Arts, Entertainment, and Recreation
48-49	Transportation & Warehousing	72	Accommodation and Food Services
51	Information	81	Other Services (except Public Administration)
52	Finance and Insurance	92	Public Administration

Each community has its own pattern of reliance on these 20 industries, which can be assessed in terms of its location quotient,

$$LQ = (e_i/e_t)/(E_i/E_t)$$

where e_i is local employment in industry i , e_t is total local employment, E_i is national employment in industry i , and E_t is total national employment (Blair & Bingham, 2000). Some of the industries in Table 11-2 generate more exports from the community to other areas of the country and, thus, define its *economic base*.

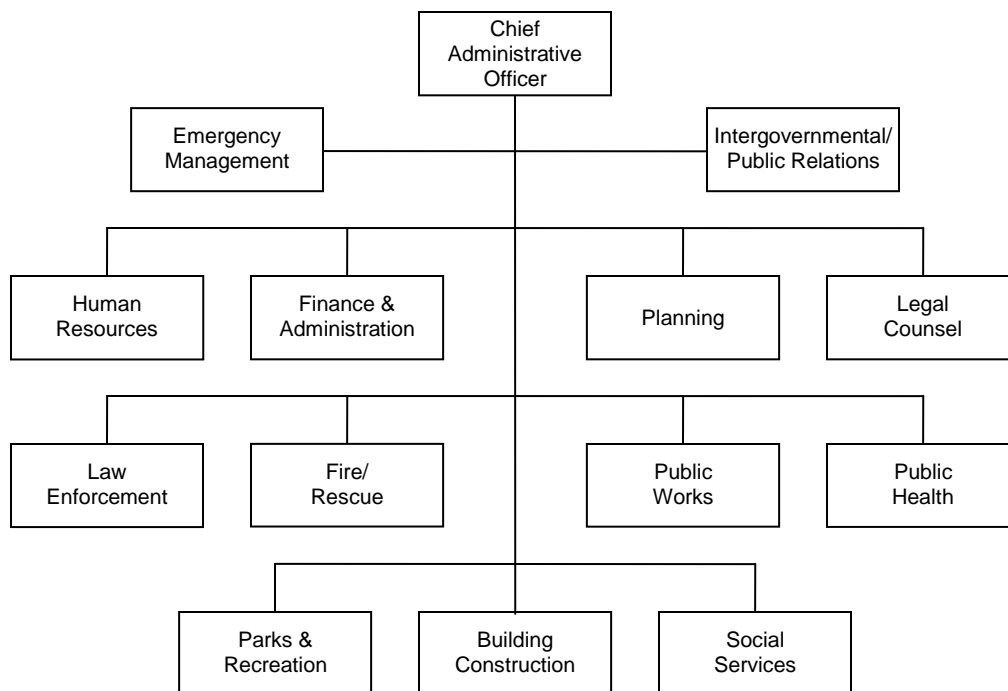
More specifically, the economic base model identifies the relative amount of the community’s production of goods and services that is derived from basic (export) economic activities, internal investment, and internal consumption (Chapin & Kaiser, 1985). More money is available for internal investment and consumption when exports, the sale of goods and services outside the community, exceed imports. Indeed, a *multiplier effect* is set in motion when money that is received from outside the community is spent inside the community. As a result, urban areas obtain between \$1.50 and \$2.50 in induced local income for every dollar of revenue from exports (Blair & Bingham, 2000). The size of the multiplier for any given region can be determined from input-output analyses that use detailed information about the degree to which the firms in each sector obtain their inputs (raw materials and infrastructure) from inside the community and export their outputs to firms outside the community. This is modified by the size of each economic sector in that region. In general, mining, manufacturing, wholesale and retail trade, banking and finance, and high quality service facilities (e.g., nationally renowned medical clinics) are considered to be significant contributors to a community’s economic base. However, there can be exceptions to this rule and it can be difficult to clearly classify businesses as basic

or service activities, to define the base area, and to measure the size of the base and service sectors (Chapin & Kaiser, 1985).

These economic concepts also have significant implications for disaster recovery. First, communities having a weak economic base characterized by low exports, low investments, and high internal consumption will need considerable assistance in recovering from a disaster. Second, basic industries that produce exports should receive immediate attention in the disaster aftermath so they can generate income whose multiplier effect will stimulate local investment and consumption. This will spread the recovery to other community industries.

Government activities. The governments of most local jurisdictions—towns, cities, and counties—perform a variety of functions that cannot reasonably be performed by businesses in the private sector (Caiden, 1982; Graham & Hays, 1993; Nigro & Nigro, 1980). Each function is assigned to governmental subunit called an agency or department. All of the departments report to the jurisdiction's CAO, who might be a mayor, city manager, or Chair of the County Board of Supervisors. Figure 11-2 displays an organization chart listing the departments typically found in local jurisdictions and indicates the direct reporting relationship by the solid line connecting each department directly to the CAO.

Figure 11-2. Sample Jurisdictional Organization Chart.



The seven departments at the bottom are usually called *line agencies*, whereas the six departments at the top of the organization chart are labeled *staff agencies*. In general, line agencies deliver services directly to the public, whereas staff agencies provide services to the line agencies and each other. By this point, it should be clear what *Emergency Management* does, so that department will not be discussed further. Among the other staff agencies, *Intergovernmental/Public Relations* provides information about the jurisdiction's activities to those outside the organization. The *Human Resources* department develops and oversees the jurisdiction's systems for personnel recruitment, selection, training,

and performance evaluation. *Finance & Administration* is responsible for budget preparation and control, accounting, property assessment, taxes and licenses, procurement, and property and records management. *Planning* assesses population and economic trends, develops the comprehensive plan and the capital improvements plan, formulates policies for land use regulation, and grants permits for land development. *Legal Counsel* is responsible for drafting ordinances, resolutions, and business contracts, as well as rendering legal opinions about proposed administrative actions and representing the jurisdiction in lawsuits.

Among the line agencies, *Law Enforcement* conducts patrols and criminal investigations, and operates jails. *Fire/Rescue* is responsible for fire prevention, fire suppression, hazmat response, and EMS. *Public Works* is responsible for constructing and maintaining public buildings, streets, and lights; traffic engineering; sewers and storm drains; and garbage and trash collection. The *Social Services* department administers public housing and welfare programs such as Aid to Families with Dependent Children and food stamps. *Public Health* monitors environmental contamination, epidemics, and immunizations. *Parks & Recreation* maintains public parks and administers programs for children's athletics and some noncredit adult education. The department of *Building Construction* reviews and approves building blueprints, inspects new construction at critical points in the construction process, and inspects existing buildings to determine if they must be condemned as unsafe for habitation. In some communities, an *Electric Utility* that purchases power and operates the electric distribution system would be added to this organization chart. The figure includes no *Education* department because this function is usually performed by an independent school district.

An Overview of Community Disaster Recovery

Disaster recovery is the phase of the emergency management cycle that begins with the stabilization of the incident and ends when the community has recovered from the disaster's impacts. The term *incident stabilization* refers to the point in time at which the immediate threats to human safety and property resulting from the physical impacts of the primary and secondary hazard agents have been resolved. Thus, the sense of uncertainty and urgency that is the hallmark of the emergency response is beginning to be replaced by thoughts about how to rebuild damaged structures, restore infrastructure services, and return the community to its normal patterns of activity. For example, earthquake recovery could be said to begin after most buried victims have been extricated, buildings in danger of collapse have been shored up, and fires have been extinguished.

As Chapter 6 indicated, most people's objective in disaster recovery is to restore the patterns of household, business, and government activity exactly as they existed before the disaster struck. To do this, they typically assume they must rebuild the buildings and infrastructure as it was. Of course, it is now understood that restoring the community to its previous status will also reproduce the hazard exposure, physical vulnerability, and social vulnerability that led to the disaster. Thus, there are four questions that must be addressed. First, do stricken communities recover from disasters and, if so, how do they acquire the resources needed to replace those that were destroyed? Second, what happens to households, businesses, and government agencies as they struggle to recover? Third, can communities do to promote a more rapid, complete, and equitable recovery? Finally, what can communities do to reduce their hazard exposure and make themselves more resilient when extreme environmental events occur?

The answer to the first question is that US communities clearly do recover relatively quickly from disasters. There is general agreement with the explanation offered by Friesma, et al. (1979) that the local

economic costs of disasters are redistributed over the entire country by means of an extensive network of social, economic, and political linkages. The paths to recovery appear to be determined by the physical characteristics of the disaster agent, the types and quantities of community resources that survive the disaster, the external aid the community can obtain, and the reconstruction strategies these communities adopt and implement. However, the fact that communities *as a whole* recover does not mean that specific neighborhoods or households within those neighborhoods recover at the same rate or even at all. Similarly, it does not mean specific economic sectors or individual businesses within those sectors will be able to maintain or even resume operations. Thus, it is important to anticipate which population segments and economic sectors will have the most difficulty in recovering. This will enable community authorities to intervene with technical and financial assistance when it is needed, monitor their recovery, and encourage them to adopt hazard mitigation measures to reduce their hazard vulnerability.

Disaster recovery has both physical and social dimensions that arise from the physical and social impacts described in Chapter 6. Thus, disaster recovery includes actions taken to cope with casualties—households must find emotion focused strategies for dealing with the loss of affective support from loved ones, as well as problem focused strategies for coping with the loss of physical resources needed to generate an income, manage the home, and rear the children. Moreover, injuries can add the emotional strain of reassuring those who have been hurt and the financial strain of their medical care. Similarly, businesses must cope with the unavailability of trained personnel who might be dead, injured, overwhelmed with caring for families and friends, or simply trying to find a place for their households to eat, sleep, and resume a semblance of a normal life.

Disaster recovery also includes actions taken to cope with property damage. Thus, households must repair minor damage and rebuild substantially damaged property. Businesses and government agencies repair commercial and industrial structures, critical facilities such as hospitals, police stations and fire stations, and infrastructure such as water, sewer, electric power, fuel, transportation, and telecommunications.

Perhaps the most distinctive, but unfortunately elusive, aspect of disaster recovery is the restoration of disrupted community social routines and economic activities. The process of “getting back to normal” involves restoring people’s psychological stability, learning positive lessons from the disaster experience, and restoring satisfying patterns of interaction with family, friends, relatives, neighbors, and coworkers. It also involves returning to full-time employment that provides at least a preimpact level of income and reestablishing normal patterns of community governance.

Unfortunately, “normal” is almost inevitably what got the community in trouble in the first place. When cities allow too much development in floodplains, or in fireprone foothills, or allow substandard housing to be built that collapses in an earthquake, “normal” is an unsustainable condition. Consequently, a disaster resilient community learns from its harsh experience which areas of the community have excessive levels of hazard exposure. It also identifies the types of buildings, infrastructure, and critical facilities that have inadequate designs, construction methods, and construction materials. Finally, it recognizes which households, businesses, and government agencies have inadequate resources, lifestyles, or operational patterns that make them unable to recover effectively from a disaster.

Moreover, a disaster resilient community learns how to use the disaster as a focusing event that changes people’s beliefs about their hazard vulnerability, the availability of hazard adjustments to reduce that vulnerability, and the portfolio of hazard adjustments that is likely to be most suitable for their community. In addition, a disaster resilient community develops effective mechanisms for mobilizing

community support to change development policies as well as government capacity and commitment for implementing those policies effectively.

The Recovery Process

This section begins by examining the most prominent typologies of disaster phases—periods of time that are characterized by specific types of activities. Next, it describes the typical processes involved in household and business recovery.

Phases of Disaster Recovery

Researchers have divided disaster recovery into a number of stages, but these definitions vary. Kates and Pijawka's (1977) frequently cited four phase model begins with the *emergency* period, which lasts for a period that ranges from a few days to a few weeks and encompasses the emergency response period when the EOP is implemented. Next comes the *restoration* period, when repairs to utilities are made, debris is removed, evacuees return, and residential, commercial, and industrial structures are repaired. This period can take weeks to months. The third phase, the *reconstruction replacement* period, involves rebuilding capital stocks and returning the economy to predisaster levels. This period can take months to years. Finally, there is the *development* phase, when commemorative structures are built, memorial dates are institutionalized, and attempts are made to improve the community. Sullivan (2003) used a similar typology consisting of four "intra-recovery elements". These include *post-impact*, *restoration*, *replacement/reconstruction*, and *commemorative, betterment, and developmental reconstruction*.

Others have divided the recovery period into somewhat different phases. United Nations Disaster Relief Organization (UNDRO, 1984) called the period from the disaster impact to Day 5 the *immediate relief* period, followed by the *rehabilitation* (Day 5 to Month 3) and *reconstruction* (Month 3 onward) periods. Schwab and his colleagues (1998) adopted a similar three phase typology that broadly distinguished among *emergency response*, *short term recovery*, and *long term recovery*. Alexander (1993) described three stages of disaster recovery, with the first, the *rehabilitation* stage, involving the continuing care of victims. During the *temporary reconstruction* stage, temporary bracing is installed for unstable buildings and bridges and prefabricated or other temporary housing is established. Finally, the *permanent reconstruction* stage relies on good administration and management to achieve full community recovery.

As was the case with conceptualizing emergency management as a sequence of phases—hazard mitigation, emergency preparedness, emergency response, and disaster recovery—defining disaster recovery as a sequence of phases is also problematic. Even the early formulations noted that these phases often overlap in practice, shortening the whole recovery period (Kates, 1977). It is now generally accepted that disaster recovery encompasses multiple activities, some implemented sequentially and others implemented simultaneously. At any one time, some households might be engaged in one set of recovery activities while others are engaged in other recovery activities. Indeed, some households might be fully recovered months or years after others and there might be households or businesses that never recover at all. Thus, attempts to define finely differentiated phases of disaster recovery are inherently limited in their validity. Because of the simple and self explanatory nature of their typology, Schwab and his colleagues' (1998) very broad distinctions among emergency response, short term recovery, and long term recovery will be used to organize the discussion in the rest of this chapter. However, the sections that follow begin with a description of what happens to two basic social units—households and businesses.

Facilitating Conditions for Disaster Recovery

Rubin (1991) found that community recovery depends upon a number of variables. Three of these variables cannot be controlled by local government. These are *federal influences and conditions*, *state influences and conditions*, and *community based needs and demands for action*. By contrast, local governments do have some control over *personal leadership*, *ability to act*, and *knowing what to do*. One important commonality among the 14 cases Rubin, et al. (1985) studied is that the speed, efficiency, and equity of community recovery depended significantly upon local government's ability to improvise effective recovery strategies. That is, communities recovered more quickly and effectively if they could identify and respond to the specific problems that arose from its unique circumstances.

Rubin and her colleagues' (Rubin, 1991; Rubin, et al., 1985) research on disaster recovery is consistent with other researchers' (see Drabek, 1986; Tierney, et al., 2001) findings on emergency response in suggesting that disaster recovery will be facilitated if local government agencies anticipate the most significant recovery demands in terms of their likelihood of occurrence and criticality to the recovery process. Anticipating recovery demands allows local agencies to plan their organizational structures and general strategies before disaster impact and improvise their tactics during recovery rather than improvise the entire recovery effort—organizational structures, strategies, tactics, and operational procedures—during the midst of the emergency response. Similarly, disaster recovery is facilitated if the recovery organization identifies the resources it will need, and the sources of those personnel, equipment, and supplies. Thus, preimpact recovery preparedness will increase emergency managers' ability to act and enhance the personal leadership exercised during disaster recovery.

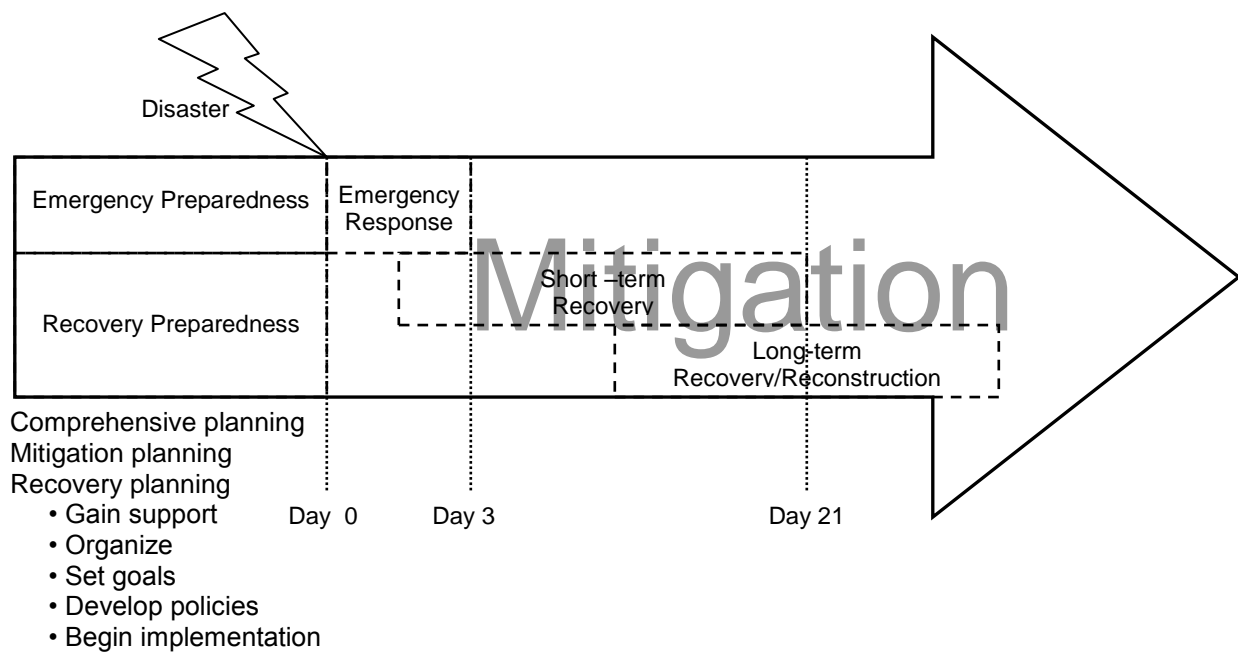
Predisaster planning is an excellent way to direct people's attention to the demands of disaster recovery (Schwab, et al., 1998). These scholars view the recovery process as a set of sequenced tasks that are performed in different locations, rather than distinct phases. There are short term decisions such as where to locate displaced households and how to remove and dispose of debris. There are also long term decisions such as how to finance reconstruction, where to allow rebuilding, and how to revitalize the local economy. According to Schwab, et al. (1998), timely and effective recovery decisions benefit from a predisaster recovery preparedness process that is undertaken at the same time as emergency preparedness, comprehensive planning, and mitigation planning (see Figure 11-3).

Developing preimpact plans for disaster recovery allows a community to ensure hazard mitigation and sustainable development are incorporated into recovery. Preimpact recovery plans can help local officials resist postimpact pressure to restore their community to the *status quo ante* that caused the disaster's physical and social impacts. By developing disaster resilience, communities can minimize disaster impacts, strengthen their ability to recover with minimal outside assistance, and facilitate the recovery of all population segments and economic sectors. These are complex issues that require time and preparation, both of which are in short supply immediately after a disaster. Preimpact recovery planning provides an excellent opportunity to incorporate sustainable development goals through a process termed "holistic disaster recovery" (Natural Hazards Research and Applications Information Center, 2001).

Disaster Recovery Functions

The strategic contingencies involved in the recovery process can be represented in terms of a network of tasks that need to be performed by community subunits. As Path A in Figure 11-4 indicates, affected households go through a process that can be described in terms of their movement through emergency shelter, temporary shelter, temporary housing, and permanent housing (Quarantelli, 1982).

Figure 11-3. The Relationship of Disaster Recovery to other Hazard Management Activities.



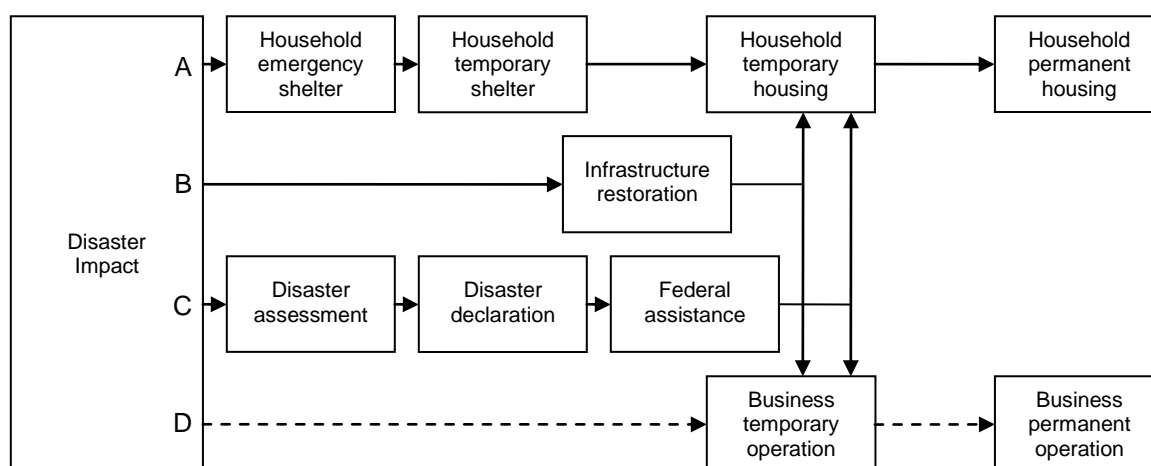
Adapted from Schwab, et al. (1998)

As Path D indicates, affected businesses pass through a slightly different sequence because they can suspend operations (represented as a dashed line) until they find a temporary operating location. As Path B indicates, households and businesses need utilities such as water/wastewater, electric power, fuel, transportation, and telecommunications before they can resume normal operations. Finally, Path C is especially important because disaster assessment and a federal disaster declaration are preconditions for the federal financial aid that the most severely stricken communities need to support the restoration of public infrastructure and the recovery of households and businesses. To explain this figure more completely, the following sections examine household recovery, business recovery, infrastructure restoration, and the disaster declaration process.

Household Recovery

There are three basic components to household recovery. These are housing recovery, employment recovery, and psychological recovery (Bolin & Trainer, 1978). All three of these components require resources to recover. However, households must invest time to obtain these resources. This includes time to find and purchase alternate shelter, clothing, food, furniture, and appliances to support daily living (Yelvington, 1997). Time is also needed to file insurance claims, apply for loans and grants, and search for jobs. The time required for these tasks is increased by multiple trips to obtain required documentation and understaffing of providers (Morrow, 1997). FEMA provides telephone registration, but its value was undercut by loss of telephone service after Hurricane Andrew. Moreover, there will be increased commuting time to work, shopping, and services if cars, street signs, traffic signals, and landmarks are destroyed and no public transit is available for weeks. Adding to the time burden is increased cost for many items due to supply scarcities. Finally, victims needed skill and self confidence to cope with the disaster assistance bureaucracy (Morrow, 1997).

Figure 11-4. The Recovery Management Process.



Housing Recovery

Households typically use four types of housing recovery following a disaster (Quarantelli, 1982a). The first type, *emergency shelter*, consists of unplanned and spontaneously sought locations that are intended only to provide protection from the elements, typically open yards and cars after earthquakes (Bolin & Stanford, 1991, 1998). The second type is *temporary shelter*, which includes food preparation and sleeping facilities that usually are sought from friends and relatives or are found in commercial lodging, although mass care facilities in school gymnasiums or church auditoriums are acceptable as a last resort. The third type is *temporary housing*, which allows victims to reestablish household routines in nonpreferred locations or structures. The last type is *permanent housing*, which reestablishes household routines in preferred locations and structures. The process of housing recovery can, in principle, be described as a stochastic process in which there is a specific probability that a household will move from one housing type to another in a given period of time (Coleman, 1964). This produces a table in which the rows indicate the current housing type, the columns indicate the housing type to which households move, and the cell values are the conditional probabilities of households moving from the row type to the column type (see Table 11-3). These conditional probabilities are represented by the mathematical notation $P(B|A)$, where the symbol $P(X)$ indicates the probability of event X , A is the housing type *from* which the household moves, B is the housing type *to* which it moves, and the vertical bar indicates that this is the probability of a household being in type B , *given that it previously was in type A*.

Unfortunately, none of the studies of housing recovery following disasters has yet estimated the transition probabilities associated with this process, but qualitative descriptions of the occupancy levels in each of Quarantelli's four housing types suggests that two distinct transition probability matrices distinguish the first week after a major disaster from later time periods. After a disaster strikes, a substantial number of households are forced to seek emergency shelter (*ES*) and in the following days most of them remain in that type of housing. Thus, according to the hypothetical probabilities in the table, the probability of remaining in emergency shelter is $P(ES|ES) = 0.6$. However, a significant proportion of the households move on to temporary shelter (*TS*), making $P(TS|ES) = 0.4$. None of the households is expected to move directly from emergency shelter to temporary housing (*TH*) or permanent housing (*PH*), so $P(TH|ES) = P(PH|ES) = 0.0$. In addition, the vast majority of those in temporary shelter remain in that housing type, so $P(TS|TS) = 0.9$, but a small fraction of them move to temporary housing,

so $P(TH | TS) = 0.1$. Similarly, the vast majority of those in temporary housing remain in that status [$P(TH | TH) = 0.1$], but a small fraction of them move to permanent housing [$P(PH | TH) = 0.1$]. A small fraction of those in permanent housing move from that status to emergency shelter or temporary shelter because of occupants' fears about structural stability or because building inspections have determined that the structures are indeed unsafe.

Table 11-3. Hypothetical Daily Housing Status Transition Probabilities.

	Week 1				Week 2 and beyond			
	Emergency Shelter	Temporary Shelter	Temporary Housing	Permanent Housing	Emergency Shelter	Temporary Shelter	Temporary Housing	Permanent Housing
Emergency Shelter	.60	.40	.00	.00	.50	.50	.00	.00
Temporary Shelter	.00	.90	.10	.00	.00	.90	.10	.00
Temporary Housing	.00	.00	.95	.05	.00	.00	.95	.05
Permanent Housing	.03	.05	.00	.92	.00	.00	.00	1.00

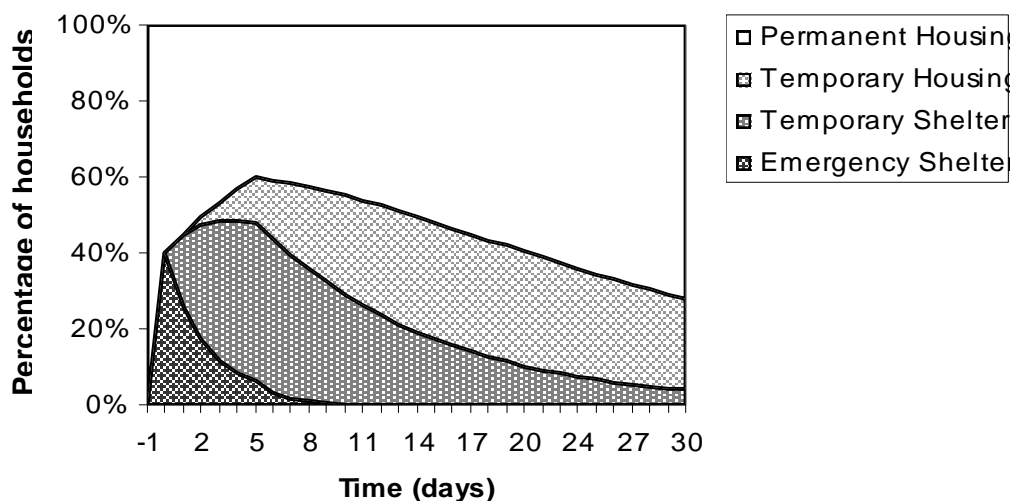
According to these hypothetical probabilities, Weeks 2 and beyond differ from Week 1 in two respects. First, the rate at which households move from emergency shelter to temporary shelter is higher in Week 2 than in Week 1. Second, the rates at which households move from permanent housing to emergency shelter and temporary shelter is lower than in Week 1. These transition probabilities can be used to generate a distribution over time of the postdisaster housing status of the impact area population (see Figure 11-5).

This figure shows that the utilization of emergency shelter peaks on the day of the disaster and declines rapidly thereafter. However, this decrease in the utilization of emergency shelter does not produce immediate increases in occupancy rates for permanent shelter. Indeed, the proportion of the affected population in permanent shelter continues to decline because many households must move to this state through the two intermediate housing types. Thus, the transition probabilities in Table 11-3 result in the displaced population continuing to rise, reaching a delayed peak some days after impact. These results are generally consistent with Bolin's (1993) finding that it took nine days for shelter occupancy to peak after the Whittier Narrows earthquake. Other support can be found in data from Hurricane Andrew. Yelvington (1997) reported that temporary shelters experienced increased demand as buildings were condemned by authorities or landlords begin reconstruction on damaged structures. On 4 September, 10 days after Hurricane Andrew, there were 41 people at Harris Field and 58 people at Florida City. Three days later the figures were 1125 and 467, respectively. By the end of September, there were more than 4000 people in four tent cities.

Sites for temporary shelter include homes of friends and relatives, commercial facilities such as hotels and motels, and mass care facilities such as Red Cross shelters. Lindell, et al. (2004) reported that during Hurricane Lili 3% of evacuees stayed in Red Cross shelters, 30% in hotels and motels, and 53% with friends and relatives. The percentage staying in shelters averages 15% but ranges from less than 1% to over 43% (Mileti, et al., 1992). The location where a household seeks temporary shelter is relatively predictable. Severity of damage and the availability of relatives nearby predict who stays with relatives, whereas income, homeownership, and availability of relatives nearby predicts who accepts relatives

(Morrow, 1997). Moreover, kin networks are likely to seek temporary shelter together, especially if all relatives became victims because they lived so close together (Yelvington, 1997). Households with higher incomes who lack nearby friends and relatives with undamaged homes seek commercial facilities, whereas lower income households in such conditions are forced to accept mass care facilities.

Figure 11-5. Impact Area Residents' Changes in Housing Status over Time.



Areas with large minority populations can pose problems for disaster assistance administrators because of their extended households (Bolin, 1993; Yelvington, 1997). Some are multigenerational (grandparents, parents, and children), whereas others are multinuclear kinship (linked by siblings) or multinuclear friendship (originating from the same town or province). These complex household structures create problems in identifying a single *head of household* to whom an assistance check can be issued. In addition to the normal reluctance to seek mass shelter and housing, some victims hesitate to approach authorities because they have no immigration documents (Yelvington, 1997).

Similarly, sites for temporary housing include homes of friends and relatives, commercial facilities such as rental houses and apartments, and mass facilities such as trailer parks. Some of these sites are in or near the stricken community, but others are hundreds or even thousands of miles away. Lack of alternative housing within an acceptable distance of jobs or peers led some households to leave the Miami area after Hurricane Andrew. The population loss was 18% in South Dade County, 33% in Florida City, and 31% in Homestead (Dash, Peacock & Morrow, 1997). Other households remained in severely damaged units—or even condemned units—without electric power or telephone service for months (Yelvington, 1997) or doubled up with relatives (Morrow, 1997).

The loss of housing in a disaster can be extremely problematic in a tight housing market. After Hurricane Andrew, housing availability dropped to 1.6% from 5.5% a year earlier. This shortage increased rents by 15-20%, which priced low income victims out of the market (Yelvington, 1997). Even when temporary housing can be found, the return to permanent housing can be long. In one working class neighborhood, the average length of displacement was 95 days and the percentage of returnees was still only 62% nearly a year after the disaster (Morrow, 1997).

Households encounter many problems during reconstruction, including high prices for repairs, poor quality work, and contract breaches (Bolin, 1993). The rebuilt structures do benefit from improved

quality and hazard resistance (Bolin, 1993, indicates 50% of respondents reported this) and this is especially true for public housing (Morrow, 1997). However, few victims think the improvements are worth the inconvenience they experienced.

As noted in Chapter 6, lower income households tend to have higher hazard exposure because they live in more hazard prone locations. They also have higher physical vulnerability because they live in structures that were built according to older, less stringent building codes, used lower quality construction materials and methods, and have been less well maintained (Bolin & Bolton, 1986). Because lower income households have fewer resources on which to draw for recovery, they also take longer to return to permanent housing, sometimes remaining for extended periods of time in severely damaged homes (Girard & Peacock, 1997). Indeed, they sometimes are forced to accept as permanent what originally was intended as temporary housing (Peacock, et al., 1987). Consequently, there might still be low income households in temporary sheltering and temporary housing even after high income households all have relocated to permanent housing (Berke, et al., 1993; Rubin, et al., 1985).

Employment Recovery

Insurance coverage varies by hazard agent, with Bolin and Bolton (1986) reporting 86% coverage for a tornado and Bolin (1993) reporting 25% for an earthquake. Risk area residents are particularly likely to forego earthquake insurance because they consider premiums to be too high and deductibles too large (Palm, et al., 1990). Income, education, and occupational status all correlate with earthquake insurance purchase (Bolin, 1993).

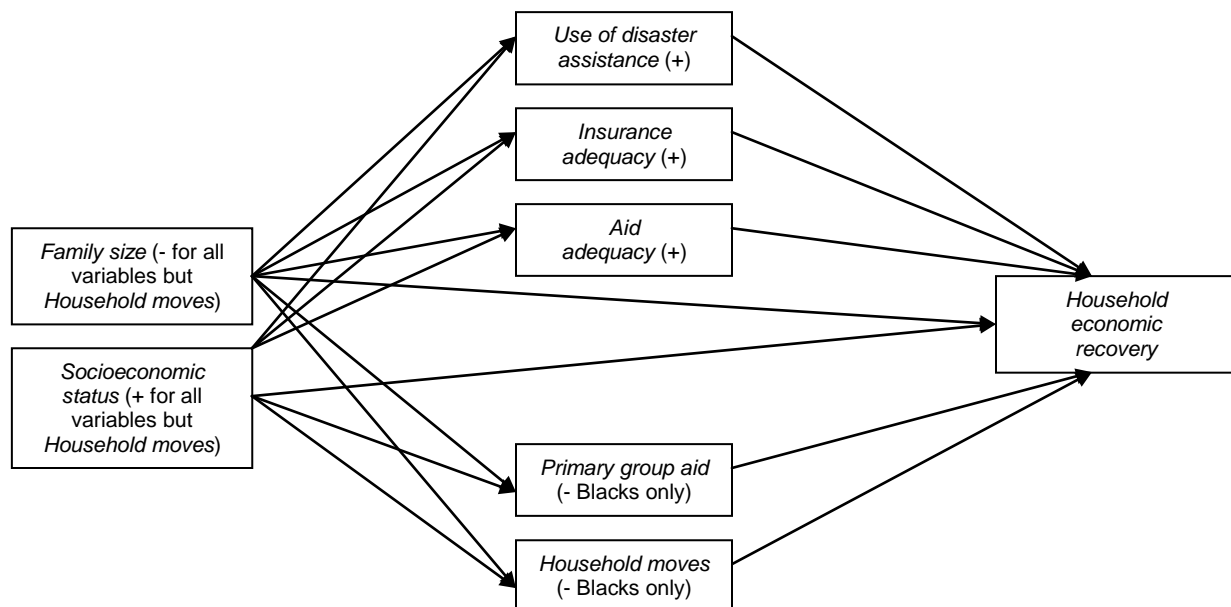
Strategies for coping with uninsured losses include obtaining SBA or commercial loans, obtaining FEMA or NGO grants, withdrawing savings, and deciding not to replace damaged items (Bolin, 1993). SBA loans can be problematic because they involve long term debt that takes many years to repay (Bolin, 1993). FEMA grants require households to meet specific standards, including proof that they are indeed residents of the disaster impact area. However, there can be problems in registering people who evacuated or were rescued without identification (Yelvington, 1997). Relaxed standards seem humane but can allow the chronically homeless and out of area construction workers to obtain access to services intended only for disaster victims. In turn, resentment toward “freeloaders” can curtail services to victims.

Some households’ economic recovery takes place quickly, but others’ takes much longer. For example, the percentage of households reporting complete economic recovery after the Whittier earthquake was 50% at the end of the first year but 21% reported little or no recovery even at the end of four years (Bolin, 1993). Economic recovery was positively related to household income and negatively related to structural damage, household size, and the total number of moves (Bolin, 1993). In some cases, this is due to the loss of permanent jobs that are replaced only by temporary jobs in temporary shelter management, debris cleanup, and construction—or are not replaced at all (Yelvington, 1997).

There are systematic differences in the rate of economic recovery among ethnic groups. For example, Bolin and Bolton (1986) found that Black households (30%) lagged behind Whites (51%) in their return to preimpact economic conditions eight months after the 1982 Paris, Texas, tornado. However, the variables affecting economic recovery were relatively similar for Black and White families (see Figure 11-6). In both ethnic groups, economic recovery was negatively related to family size (larger families had lower levels of recovery), but positively related to socioeconomic status (SES—education, profession, and income), use of disaster assistance, insurance adequacy, and aid adequacy. In addition, Black household recovery was negatively related to primary group aid and the number of household moves. The direct effect of family size and SES on economic recovery was compounded by the indirect

effects of these variables via their impacts on the use of disaster assistance, insurance adequacy, aid adequacy, and household moves. The variables that had positive direct effects on economic recovery (use of disaster assistance, insurance adequacy, aid adequacy) were negatively related to family size and positively related to SES. That is, larger households were less likely—and higher SES households were more likely—to use disaster assistance, have adequate insurance, or receive adequate aid. Moreover, these variables were positively related to family size and negatively related to SES. That is, larger households made more moves and higher SES households made fewer moves. The overall effect of this complex pattern of relationships is for large poor households to be doubly handicapped in their economic recovery.

Figure 11-6. Patterns of Household Economic Recovery.



Source: Bolin and Bolton (1986)

Psychological Recovery

Few victims develop major psychological problems from disaster impacts. Indeed, Gerrity and Flynn (1997, p. 108) proposed “the overarching principle of mental health services after disasters is that the recipients of services are normal people, responding normally, to a very abnormal situation.” Consequently, the vast majority of disaster victims experience mild psychological distress. For example, Bolin and Bolton (1986) found negative impacts such as upsets with storms (61%), time pressures (48%), lack of patience (38%), and strained family relationships (31%) after the Paris Texas tornado. However, victims also experienced positive impacts including strengthened family relationships (91%), decreased importance of material possessions (62%), and increased family happiness (23%). The data showed only minor differences between Blacks and Whites in the prevalence of psychosocial impacts.

Similarly, roughly 35% of affected households reported one or more symptoms of psychological distress attributable to the Whittier earthquake (Bolin, 1993). These included startle response (60%), sadness (38%), avoidant thinking (36%), vivid upsetting memories (33%), unexplained agitation (29%), social isolation (25%), bad dreams (20%), and sleep disturbances (15%). Degree of emotional recovery was positively related to age, male gender, previous disaster experience, social integration, and receipt of aid from primary groups.

Researchers have also examined public records in their search for psychological impacts of disasters. For example, Morrow's (1997) examination of vital statistics (births, marriages, deaths, and divorce applications) had no significant long term trends due to Hurricane Andrew. However, domestic violence rates remained constant for about six months after the hurricane but increased about 50% for nearly two years after that. In all, only 12% of the households affected by Hurricane Andrew expressed a need for counseling (Morrow, 1997). After the Whittier earthquake, Disaster Assistance Centers referred only 5% of victims to mental health counseling (Bolin, 1993). The effects most of these victims have experienced are usually not debilitating but are, rather, part of the normal process of grieving people use to understand and assimilate important, traumatic events. Moreover, victims accumulate many minor and major frustrations throughout the disaster recovery. This is especially true for those who must interact repeatedly with public (governmental) and private (e.g., insurance companies) bureaucracies.

Nonetheless, there are especially vulnerable groups that might need extra attention if they show signs of long standing problems due to the disaster. It should be obvious that people with preexisting mental conditions are likely to need postdisaster psychological support. Moreover, victims who have witnessed the death or severe injury of loved ones should have professional psychological services available (Perry & Lindell, 1978). Single female heads of household experienced extremely high levels of stress in their relationships with significant others, children, and relatives and friends (Morrow, 1997). In a community where the schools were on half day sessions, children in one third of families displayed behavioral problems (Morrow, 1997). Moreover, approximately 50% of children displayed symptoms of moderate to severe PTSD after Hurricane Andrew (Vernberg, LaGreca, Silverman & Prinstein, 1996). Finally, professionals involved in particularly difficult search operations and medical personnel who handle extraordinary work loads during disaster periods might also benefit from postdisaster counseling.

In summary, the majority of victims and responders recover relatively quickly from the stress of disasters without psychological interventions. Those who suffer the greatest losses to their material resources (e.g., the destruction of their homes) and their social networks (e.g., spouses and other family members) are likely to experience the most psychological distress, but not necessarily an amount that is personally unmanageable. Thus, the appropriate strategy for psychological recovery by victims and first responders seems to be one of minimal intervention to provide information about sources of material support (for victims) and to facilitate optional involvement in social and emotional support groups (for victims and first responders).

Sources of household recovery assistance. Household recovery can also be defined in terms of the sources of assistance. Bolin and Trainer (1978) defined these sources as the family structure (stage in the family lifecycle) and resources (socioeconomic status), the kinship network (cohesiveness), and the community resource (financial, human, and material resources) and normative (beliefs about appropriate policies for distributing postdisaster aid) structure. The extent to which households rely on one or another of these sources of recovery assistance defines their mode of recovery as autonomous, kinship, or institutional—although few households actually rely on only one source.

Autonomous recovery depends on the household's available human, material, and financial resources. Human resources are available to the extent the household members have come through the disaster alive, uninjured, and with a sense of optimism that they can recover. Household recovery also depends on the degree to which members can continue to derive generate income from employment, rental of physical assets, or interest/dividends from financial assets. Moreover, household recovery depends on the degree to which material resources are available. This includes the extent to which its

possessions—land, buildings, equipment, furniture, clothes, vehicles, crops, and animals—are undamaged or can be restored at reasonable expense. A household's recovery also depends on the degree to which its financial resources are available. This includes an ability to withdraw savings quickly from banks, to quickly liquidate stocks and bonds at a fair price, and to receive adequate compensation from its insurer. In some cases, household recovery also depends on the degree to which creditors will accept delayed payments on financial liabilities such as loans, mortgages, and credit card debt. Finally, household recovery depends on the degree to which members can reduce consumption such as purchases of shelter, food, clothing, medical care, entertainment, and other goods and services).

Kinship recovery depends on the physical proximity of other nuclear families in the kin network, the closeness of the psychological ties within the network, the assets of the other families and, of course, the extent to which those families also suffered losses. Institutional recovery quite obviously depends on whether victims meet the qualification standards, usually documented residence in the impact area and proof of loss. However, institutional recovery depends more subtly on households' ability to devote the time and effort required to travel to assistance centers and wait to process any applications, the availability of transportation and child care needed to free that time from other activities, and the ability to fill out the paperwork and cope with the impersonal bureaucratic requirements of the recovery system.

Some aspects of household recovery are relatively similar across ethnic groups, but others reveal distinct differences. For example, Table 11-4 shows Anglos, Blacks, and Hispanics experienced similar levels of frustration in coping with the challenges of living in damaged homes, job relocation, dealing with agencies, behavioral problems with children, and loss of household members. However, most of these commonalities were for relatively infrequently experienced problems (the ones listed at the bottom of the table). By contrast, there were significant differences in the experience of other problems, many of which were frequently experienced. For some problems, the Anglos reported the greatest frequency of frustration, whereas for other problems it was Hispanics experiencing the greatest frustrations. In general, Blacks had the highest level of frustration with more problems than either of the other two groups.

Business Recovery

Several studies of the economic impacts of environmental disasters have examined the ways in which individual businesses prepare for, are disrupted by, and recover from these events. Dahlhamer and D'Souza (1997), Dahlhamer and Reshaur (1996), Drabek (1991c, 1995), Lindell and Perry (1998), Tierney (1997a, 1997b), Tierney and Dahlhamer (1998), and Whitney, et al. (2001) studied the adoption of hazard adjustment (hazard mitigation, emergency preparedness, and disaster recovery preparedness) measures for environmental hazards. These studies found older, larger (measured by the number of employees), and more financially stable businesses are more likely to adopt hazard adjustments, as are businesses in the manufacturing, professional services, and finance, insurance and real estate sectors.

These studies have found disasters disrupt business operations through a variety of mechanisms (Alesch, et al., 1993; Kroll, et al., 1990; Tierney, 1997b; Tierney & Nigg, 1995; Webb, et al., 2000). Direct physical damage to buildings, equipment, vehicles, and inventories has obvious effects on business operations. However, it might be less obvious that disruption of infrastructure such as water/sewer, electric power, fuel, transportation, and telecommunications frequently forces businesses to shut down in the aftermath of a disaster. For example, Tierney (1997b) reported that extensive lifeline service interruption after the 1993 Midwest floods caused a large number of business closures in Des Moines, Iowa, even though the physical damage was confined to a relatively small area.

Table 11-4. Household Recovery Problems, by Ethnic Group.

Problem Perceived To Be Large	Anglo	Black	Hispanic	Total
Dealing with mortgage companies about insurance money	68	49	68	64*
Dealing with building inspectors	52	38	76	63*
Living in damaged home	59	63	59	60
Neighborhood conditions	55	60	39	47*
Living in temporary quarters	45	61	38	46*
Dealing with insurance companies	33	26	48	40*
Dealing with contractors	38	18	45	37*
Unemployment	11	29	30	25*
Household finances	14	40	20	22*
Neighborhood crime	34	23	16	22*
Transportation	2	28	17	16*
Job relocation	7	21	17	15
Dealing with agencies	11	20	13	15
Behavioral problems with children	19	18	10	14
Family violence	17	11	5	9*
Gain of member(s)	14	0	4	5*
Loss of member(s)	4	0	13	4

Source: Morrow (1997) Difference between highest and lowest percentage significant at $p < .05$.

Small businesses are more physically vulnerable because they are more likely than large businesses to be located in nonengineered buildings and are less likely to have the capacity to design and implement hazard management programs to reduce this physical vulnerability. Thus, in this respect, small businesses are equivalent to the most physically vulnerable households—ones that are poor, female headed, or members of ethnic minorities. At the same time as they face increased costs to repair structures and replace contents, these businesses also face reduced patronage if they must move far from their previous locations. Three years after the Whittier earthquake, 50% of destroyed commercial space and 100% of damaged commercial space had been replaced (Bolin, 1993). In the meantime, however, a number of businesses in the old central business district—predominantly located in unreinforced masonry structures—were forced to relocate. Because Whittier is located within the Los Angeles metropolitan area, local residents could readily obtain the goods and services they needed from undamaged businesses in adjacent communities. Thus, by the time the space is available for reoccupancy, it must be leased to new tenants because the old ones did not have the resources to wait that long.

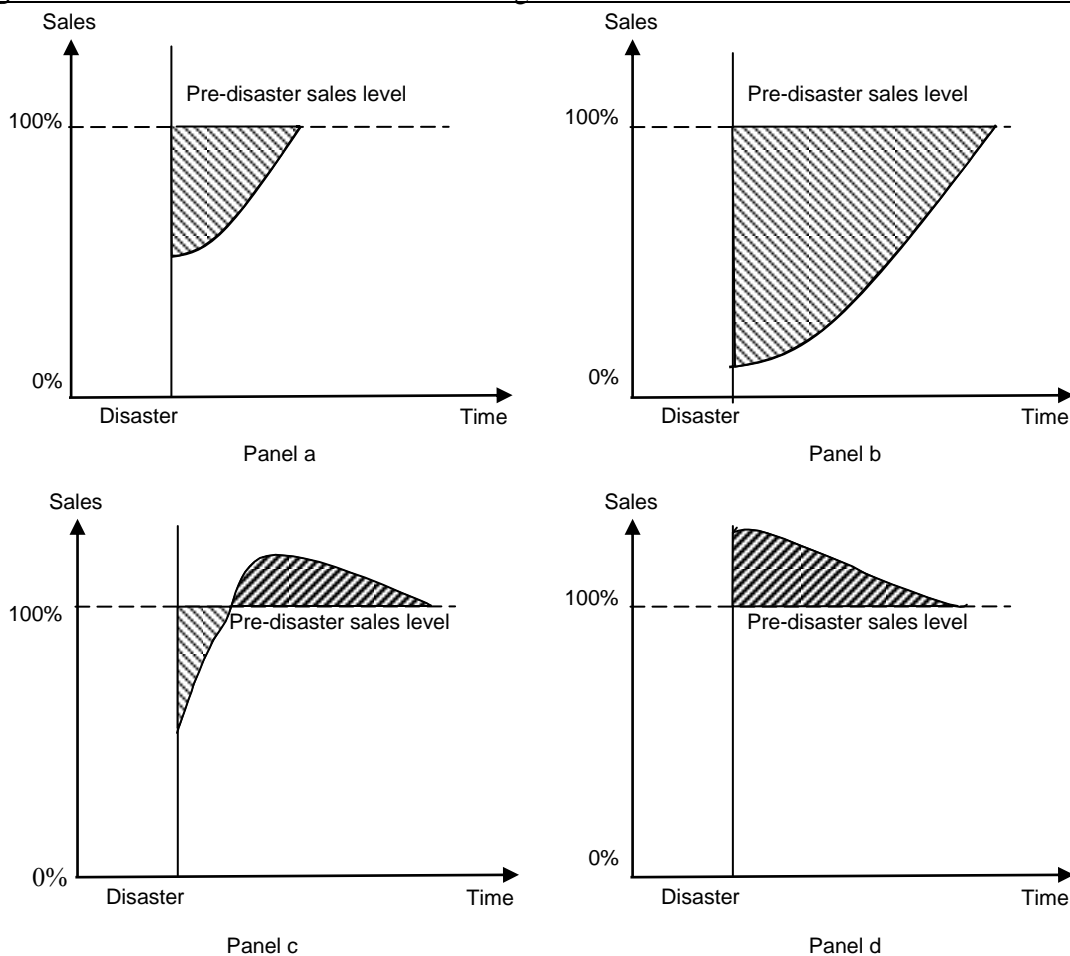
Perhaps the least obvious effects of disaster impact are population dislocation, losses in discretionary income among those victims who remain in the impact area—which can weaken market demand for many products and services—and competitive pressure from large outside businesses. All of these indirect effects cause small local businesses to experience a high rate of failure in the aftermath of a disaster (Alesch & Holly, 1996; Alesch, Holly, Mittler & Nagy, 2001). Indeed, these factors can produce business failures long after the precipitating event, especially if the community was already in economic decline before the event (Bates & Peacock, 1993; Durkin, 1984; Webb, et al., 2002). Thus, businesses that were marginally profitable before a disaster strikes are more likely to close immediately after the event.

There also is variation among business sectors in their patterns of recovery. Whereas wholesale and retail businesses generally report experiencing significant sales losses, manufacturing and construction companies often show gains following a disaster (Durkin, 1984; Kroll, et al., 1990; Webb, et

al., 2000). Moreover, businesses that serve a large (e.g. regional or international) market tend to recover more rapidly than those that only serve local markets (Webb, et al., 2002). Small businesses, in particular, have been found to experience more obstacles than large firms and chains in their attempts to regain their predisaster levels of operations. Compared to their large counterparts, small firms are more likely to depend primarily on neighborhood customers, lack the financial resources needed for recovery, and lack access to governmental recovery programs (Alesch & Holly, 1996; Alesch, et al., 2001; Dahlhamer & Tierney, 1998; Durkin, 1984; Kroll, et al., 1990). Thus, business sector and business size can be seen as indicators of operational vulnerability that are equivalent to the demographic indicators of social vulnerability in households.

Businesses' hazard vulnerability explains the changes a disaster causes in businesses' production, sales, and profits and, thus, the dynamics of business recovery. In particular, four cases can be used to illustrate firms' variation in their postdisaster sales levels (Zhang, Lindell & Prater, 2004). According to Figure 11-7, gains and losses in sales (the vertical axis) over time (the horizontal axis) are defined by the area enclosed within the (vertical) disaster line, the (horizontal) predisaster sales level, and the (diagonal) recovery curve. Gains are represented by the size of the area above the predisaster sales level and losses are represented by the size of the area below the predisaster sales level (the shaded area in each panel).

Figure 11-7. Patterns of Business Sales Changes after Environmental Disasters.



Source: Zhang, et al. (2004)

The first case is defined by businesses in the impact area that have minimal hazard vulnerability. Such businesses—professional services are an example—experience only small decreases in sales after disaster impact and return quickly to their predisaster levels (Figure 11-7a). The second case consists of businesses that also are in the impact area, but have moderate vulnerability. Such businesses—large manufacturers, for example—experience a larger initial drop in their sales levels and their recovery takes a longer time (Figure 11-7b). Tourism oriented businesses may also suffer initial losses and take some time to recover to their prior level of profitability because they may be stigmatized in the aftermath of a disaster and can take several seasons to shed the image of danger and destruction.

By contrast, the third case consists of businesses that experience initial sales losses because they are inside (thus experiencing direct losses) or near (thus experiencing indirect losses) the impact area. However, they later experience an increase in demand for their products/services during disaster aftermath (Figure 11-7c). Recovery-related businesses in the building construction, construction materials, and hospitality (e.g., hotels and restaurants) industries exemplify a pattern in which an initial loss (e.g., due to minor damage or infrastructure disruption) is rapidly restored and followed by increased sales. The final case describes recovery related businesses that are just outside the impact area. Not only do they avoid any initial losses, but they also can take advantage of expanded demand in the disaster stricken community and reap gains in the aftermath of the disaster (Figure 11-7d).

Although the available data are limited, some of these principles are revealed in data from business recovery in two communities affected by Hurricane Andrew (Dash, et al., 1997). Homestead had a larger population, a higher per capita income, and a higher average home value than Florida City. Homestead was 42% Anglo and 35% Hispanic, whereas Florida City was 61% Black and 37% Hispanic. Even though Florida City is slightly farther from the point at which the hurricane eye made landfall, there was essentially no initial difference in the hurricane's impact on the two city's businesses. The overall commercial property loss after the hurricane was 29% in Homestead and 32% in Florida City. However, Table 11-5 describes the business impacts of the hurricane in terms of the changes in the number of businesses, number of employees, and sales volume in each of the industries operating in these cities.

Overall, there were significant differences in the two communities over the next year. For example, total sales volume declined 83% in Florida City but only 1.1% in Homestead. However, inspection of Table 11-5 reveals that there are distinct differences from one industry to another and the magnitude of the impact depends on whether one examines the change in the number of businesses, the number of employees, or sales volume. For example, Florida City shows dramatic declines for agriculture on all three indicators but no change or even modest increases in construction. By contrast, Homestead showed a slight increase in the number of agricultural businesses, but significant increases in the number of agricultural jobs and sales volume. Moreover, it experienced significant declines for all three indicators in construction—almost the opposite pattern of Florida City. These differences in business impacts indicate local authorities should carefully assess the businesses in their communities before a disaster strikes and monitor their economic viability in the disaster's aftermath to determine if government intervention is needed.

The Role of State and Federal Governments

State and federal agencies can play significant roles in disaster recovery, but the burden most frequently falls on local governments because only about 19% of all disasters receive state disaster declarations and 1% qualify for Presidential Disaster Declarations (PDDs). Thus, local governments

should prepare to undertake a variety of functions during a disaster recovery process, understanding that they might not receive any aid from higher levels of government for minor disasters. The main factor affecting the level of involvement of state and federal government is the scope of the event. After a major disaster, a PDD opens a broad range of programs for relief and reconstruction. In such cases, the state plays a coordinating role, working with both federal and local governments. Moreover, disaster response might be mostly over before the PDD is granted, but federal assistance is certainly welcome when it finally arrives. The Recovery Function Annex of the National Response Plan of January 2003, available on the DHS Web site (www.dhs.gov/dhspublic/), lists 71 federal disaster recovery programs that are administered directly by the DHS or by dozens of other federal and volunteer organizations. The following discussion is not exhaustive, but gives an overview of some of the key programs.

Table 11-5. Changes in the Number of Businesses, Employees, and Sales Volume after Hurricane Andrew.

Industry	Businesses Change (%)		Employees Change (%)		Sales Volume Change (%)	
	Florida City	Homestead	Florida City	Homestead	Florida City	Homestead
Agriculture	-71	+4	-92	+74	-93	+66
Construction	0	-20	+12	-20	+12	-59
Manufacturing	0	-12	-67	-19	-59	-32
Transportation/ communication	-50	+9	-100	+4	-26	+51
Wholesale trade	-60	-4	-50	+6	-84	+57
Retail trade	-64	-2	-84	+16	-84	-5
Finance/ insurance/real estate	-20	0	-59	-1	-32	-32
Business services	-63	+6	-94	-5	-65	-14
Professional services	-45	-3	-73	+16	-69	+1
Public administration	-50	+38	-69	+7	n/a*	n/a*

Source: Dash, et al. (1997), Sales volume is not applicable to public sector organizations.

The lead agency at the federal level is FEMA, renamed the Emergency Preparedness and Response Directorate when it was placed in the new Department of Homeland Security in 2002. Other federal agencies might be called upon when a PDD is granted, including the Small Business Administration, the US Army Corps of Engineers, the Department of Housing and Urban Development, the National Oceanographic and Atmospheric Administration, and the Economic Development Administration, among others. Each of these agencies funds specific disaster recovery programs.

The National Response Plan provides for the establishment of Disaster Field Offices (DFOs) in the vicinity of the disaster. Emergency Response Teams (ERTs) are located in the DFOs. These include an Operations Section that coordinates federal, state, and voluntary efforts. The ERT Operations Section has a Human Services Branch that is responsible for many tasks including needs assessment; establishment of Disaster Recovery Centers; initiation, coordination, and delivery of recovery programs authorized by the Stafford Act; and managing DHS and state grant programs. Finally, there is an Infrastructure Support Branch to facilitate restoration of public utilities and other infrastructure services. There is also a Deputy Field Coordinating Officer for Mitigation who coordinates with the Infrastructure Support Branch and otherwise promotes mitigation and preparedness activities.

The main types of programs providing recovery assistance are Individual Assistance, Infrastructure Support (formerly Public Assistance), and Hazard Mitigation Grant Program. Individual Assistance is available to households through the Temporary Housing Assistance program, Individual and Family Grants, Disaster Unemployment assistance, legal services, special tax considerations, and crisis counseling programs. Individuals and businesses can receive aid through the Small Business Administration Disaster Loans program, which can provide loans for repairs to housing and businesses, and also for operating expenses. In the past, many loan programs have been inaccessible to low income households, which tend to rent rather than own their housing. Thus, they failed to qualify for loans because of their low incomes and lack of collateral. The Individual and Family Grant Program was intended to fill the need for a program targeting those whose needs were not being met by the SBA loan program, private insurance, or NGO assistance. However, the amounts awarded tend to be small.

Public Assistance programs offered through the Infrastructure Support Branch are targeted at state and local governments, certain nonprofit organizations that provide emergency services, and Indian tribes. These programs provide funds for the repair or replacement of public facilities damaged by disaster. They may be classified as Emergency Work under Category A (Debris Removal) or Category B (Emergency Protective Measures) or Permanent Work, under Category C (Roads and Bridges), Category D (Water Control Facilities), Category E (Buildings and Equipment), Category F (Utilities), or Category G (Parks, Recreational Facilities, and Other Items).

Assistance provided under the Hazard Mitigation Grant Program has increased in importance since the passage of the Disaster Mitigation Act of 2000. This legislation requires local governments to identify potential mitigation measures that could be incorporated into the repair of damaged facilities in order to be eligible for pre- and postdisaster funding. This policy represents a significant shift from previous FEMA policies that inhibited the implementation of mitigation measures because repairs were only funded to the level of predisaster conditions. The recent shift is putting more emphasis on activities eligible under Section 406 of the Stafford Act, known as *406 mitigation*. These activities include hazard mapping, mitigation planning, development of building codes, development of training and public education programs, establishing Reconstruction Information Centers, and assisting communities to promote sustainable development.

State governments vary widely in the level of attention and resources they devote to planning for and implementing disaster recovery. Some states have established programs providing assistance to households and local governments for recovery from disasters that do not receive a PDD. In order to support these programs, some states have created state disaster funds and designated several state level departments to provide resources and expertise that are available during recovery. One example is a state planning or community development department, which can provide data or guidance on integration of sustainable development and recovery. Other examples are state environment departments, which might have coastal management programs or water quality programs, and state economic development agencies, which might administer Community Development Block Grants that can fund repairs to low income housing.

States can fund their programs through the creation of state disaster funds, but only about half of the states have done so. Typically, state legislatures have appropriated funds after disasters on the basis of need. Another type of disaster fund is a disaster trust fund, which creates revenue by dedicating a percentage of sales taxes or other revenues to the fund. For a more detailed discussion of federal and state disaster recovery programs, see Smith (2004).

The Role of Hazard Insurance

As noted in Chapter 7, hazard insurance is a preimpact recovery preparedness action. As such, it has the potential for completely replacing current programs of disaster relief. In addition, hazard insurance decreases government workload and expense after disasters by shifting part of the administrative burden for evaluating damage to insurance companies in the private sector. Finally, hazard insurance defines the terms of coverage in advance, thus reducing opportunities for politicians to increase benefits after disaster. The desire to appear to be generous creates a temptation to vote for “pork barrel” projects. The problem is that generous aid for uninsured victims angers those who had the foresight to purchase insurance in advance and, thus, provides a disincentive to purchase insurance in the future.

Unfortunately, the potential contribution of hazard insurance remains to be fully realized. There are many difficulties in developing and maintaining an actuarially sound hazard insurance program. The National Flood Insurance Program has made significant strides over the past 30 years, but it continues to require operational subsidies. One of the basic problems is that those who are most likely to purchase flood insurance are, in fact, those who are most likely to file claims (Kunreuther, 1998). This problem of *adverse selection* makes it impossible to sustain a market in private flood insurance. The federal government has tried to solve this problem by requiring flood insurance for structures located in the 100 year flood plain that are purchased with federally backed mortgages. Unfortunately, homeowners frequently allow their policies to lapse after the first year and the program has no effect on those who purchase their homes without a mortgage or have paid off their mortgages. Consequently, some homes are rebuilt soon after a disaster because their owners have high quality insurance coverage, whereas other homes take much longer because they are only partially insured. In some cases, the homeowners lack *any* insurance because they cannot afford quality insurance or were denied access to it because of “redlining” (Peacock & Girard, 1997).

In addition to these institutional problems, there are cognitive obstacles to developing a comprehensive hazard insurance program. Building on earlier hazards research (see Burton, et al., 1993, for a summary) and psychological research on judgment and decisionmaking (see Slovic, et al., 1974, for an early statement and Baron, 2000, or Gilovich, Griffin & Kahneman, 2002, for more recent summaries), researchers have identified numerous logical deficiencies in the ways people process information in laboratory studies of risk.

One important issue concerns what economists call moral hazard and psychologists refer to as a felt lack of personal responsibility for protection. The concept of moral hazard/felt responsibility for personal protection has important policy implications because the Interagency Floodplain Management Review Committee (1994) report concluded federal disaster relief policy creates this condition by relieving households of the responsibility for providing their own disaster recovery resources. This might be a significant reason why only 20% of structures affected by the 1993 Mississippi floods were insured. However, there appears to be no data on the extent to which households explicitly consider the availability of disaster relief in making decisions about whether to purchase hazard insurance and adopt other hazard adjustments.

Non Governmental Organizations and Community Based Organizations

The role of NGOs such as the American Red Cross, Salvation Army, and Mennonite Disaster Service is widely publicized and the role of CBOs such as local churches and service organizations is increasingly recognized. These organizations provide housing, food, clothing, medicine, and financial

assistance to disaster victims. In most cases, the *existing* government social service agencies are supplemented by NGOs that *expand* their membership to perform the tasks they are expected to perform during disaster recovery (Dynes, 1970). By contrast, existing CBOs typically *extend* themselves beyond their normal tasks to perform novel activities. In addition, there are situations in which existing, expanding, and extending organizations cannot successfully meet the recovery needs of disaster victims. In such cases, government agencies, NGOs, and CBOs form an *Unmet Needs Committee*, which is an *emergent* organization that is designed to serve those whose needs are not being addressed by existing programs.

In some cases, the need for such emergent organizations arises from political organization and activism by population segments that believe they are being neglected (Morrow & Peacock, 1997; Phillips, 1993a). Local authorities should anticipate recovery demands, plan for an *Unmet Needs Committee*, and communicate its existence throughout the community. When emergent organizations do arise, they can be incorporated into the ongoing recovery management process in order to learn from their knowledge about the unmet needs and ensure that there is an equitable distribution of disaster recovery resources. For a more detailed discussion of NGO activities in disaster recovery, see Smith (2004).

Local Government Recovery Functions

After a disaster, local government needs to perform many tasks very quickly, and many of these must be performed simultaneously. It is therefore critical to plan for disaster recovery, as well as for disaster response (Schwab, et al., 1998). The line between emergency response and disaster recovery is not clear because some sectors of the community might be in response mode while others are moving into recovery, and some organizations will be carrying on both types of activity at the same time. This means that there will be little time to plan for disaster recovery once the emergency response has begun. By planning for recovery before disaster strikes, resources can be allocated more effectively and efficiently, increasing the probability of a rapid and full recovery. The following discussion is based on the concept of preimpact planning for disaster recovery because a lack of planning will delay decisions about the allocation of recovery resources and the procedures by which they will be used. A lack of preimpact planning can also increase the probability of conflicts arising due to competition over scarce resources during the recovery period.

The previous sections of this chapter have described the tasks that households and businesses perform during disaster recovery and the resources they use to implement this recovery. When households and businesses lack the knowledge of how to recover or the resources needed to recover, government can provide assistance. Local government must also perform specific tasks during disaster recovery, some of which involve restoring services it performed before the disaster (e.g., providing functioning roads, street lights and signs, and traffic control devices). In addition, local government must rebuild any critical facilities (e.g., police and fire stations) that were damaged or destroyed. Finally, local government has a heightened need to perform its regulatory functions regarding land use and building construction. These two functions require rapid action under conditions of a greatly multiplied workload, so special provisions are required to expedite the procedures for reviewing and approving the (re)development of private property.

In approaching the task of preimpact recovery planning, a community must overcome three major misconceptions about disaster recovery. The first misconception is that the entire recovery effort can be improvised after the emergency response is complete. In fact, a timely and effective disaster recovery

requires a significant amount of data collection and planning that will delay the recovery if they are postponed until after the emergency response is over. It is important to recognize that the disaster response phase's uncertainty and urgency about human safety has been replaced by households' and businesses' urgency to return to normal patterns of functioning and government agencies' uncertainty about how to organize the community to accomplish this.

The second misconception is that there will be ample time to collect data and plan the recovery during the emergency response. It is true that some recovery relevant data must be collected during the emergency response. However, an assessment of "lessons learned" from the disaster impact should be used to guide a recovery process that has been designed before the disaster strikes. Finally, the third misconception is that the objective of disaster recovery should be to restore the community to the conditions that existed before the disaster. As noted earlier, this will simply reproduce the community's existing disaster vulnerability.

In many ways, the process of preparedness for disaster recovery is quite similar to the process of preparedness for emergency response. Thus, the community should establish a Recovery/Mitigation Committee before disaster strikes that will establish a vision of community disaster recovery and articulate the basic strategies that will be implemented before and after disaster impact. In addition, the committee should assign each recovery function to a specific organization, develop a Recovery Operations Plan (ROP), and acquire any necessary resources to implement it. Finally, the committee should conduct the training and tabletop exercises needed to ensure the ROP can be implemented effectively.

The Recovery/Mitigation Committee

The LEMC's Recovery/Mitigation Committee can be an important part of an effective, rapid disaster recovery process. As noted in Chapter 3, this committee should be established before a disaster during the preimpact recovery planning process. Personnel should be designated to serve on this committee, including a chairperson and a lead agency, usually the local planning department. The jurisdiction's Chief Administrative Officer, usually the city mayor or the county executive, should publish a planning directive, and the Recovery/Mitigation Committee chairperson should establish a planning schedule. Many government agencies should participate in the Recovery/Mitigation Committee, including the directors of the local planning, building, public works, engineering, parks and recreation, economic development, finance, housing, and social services departments, as well as the jurisdiction's PIO (Schwab, et al., 1998). In addition, there should be representatives from local utility companies, other local business organizations, religious and charitable organizations, and representatives of neighborhood associations.

The Recovery/Mitigation Committee should examine the findings from the community HVA to identify the locations having the highest levels of hazard exposure, physical vulnerability, and social vulnerability. The committee should begin to work with the rest of the community, and especially with those at greatest risk, to formulate a vision of the disaster recovery it intends to implement.

Next, the committee should develop an ROP that integrates the likely disaster impacts, community goals, and public and private sector capabilities within the community. In addition, the ROP should identify external sources of assistance (federal, state, NGO), recognize their loan/grant requirements, and integrate these into a comprehensive program of disaster assistance. The committee should also develop a financial plan for responding to the disaster. Bolin (1993) reported that city revenues from a heavily damaged central business district were 5% of total revenues before the

earthquake, declined sharply in the year after the earthquake, and took about four years to return to previous level. This clearly affects the jurisdiction's tax revenues.

Moreover, the committee should establish agreements with NGOs and CBOs (especially local churches, neighborhood associations, and other citizens' groups) for support in disaster recovery because these organizations provide financial and in-kind support, as well as legal and technical assistance. After a disaster strikes, the Recovery/Mitigation Committee should ensure that organizations respond within the scope of their responsibilities to implement the ROP.

Envisioning a Community Recovery Strategy

The Recovery/Mitigation Committee needs to work with the community before and after a disaster to articulate a vision of community disaster recovery. The recovery process needs to strike a balance between corporate centered and community based economic development (Bingham, 2000). According to a *corporate centered economic development*, usually advocated by the local business community, government provides resources such as land and money to the private sector to invest without any restrictions. This market based strategy tends to produce results that are good in aggregate but produces an inequitable recovery. By contrast, *community based economic development* involves active participation by government to ensure that the benefits of recovery will also be shared by economically disadvantaged segments of the community.

The short term recovery following a major disaster can generate an economic boom as state and federal money flows into the community to reconstruct damaged buildings and infrastructure. These funds are used to pay for construction materials and the construction workforce and, to the extent that the materials and labor are acquired locally, they generate local revenues. In addition, the building suppliers hire additional workers and these, along with the construction workers, spend their wages on places to live, food to eat, and entertainment. Unless there are undamaged communities within commuting distance that can compete for this money, it will all be spent within the community.

Communities must also consider the long term economic consequences of disaster recovery. What will happen after the reconstruction boom is over? They can attract new businesses if they have a skilled labor pool and good schools—especially colleges whose faculty and students can support knowledge based industries. Other assets include low crime rates, low cost of living, good housing, and environmental amenities such as mountains, rivers, or lakes (Blakely, 2000). A community can also enhance its economic base if it can attract businesses that are compatible with the ones that are already there. Such firms can be identified by asking existing firms to identify their suppliers and distributors. These new firms might be attracted by the newer buildings and enhanced infrastructure that has been produced during disaster reconstruction.

If a disaster stricken community does not already have such assets, they can invest in four fundamental components of economic development—locality development, business development, human resources development, and community development. *Locality development* enhances a community's existing physical assets by improving roads or establishing parks on river and lakefronts. *Business development* involves efforts to retain existing businesses or attract new ones. Although it is not easy, this can be accomplished working with businesses to identify their critical needs. In some cases, this might involve establishing a business incubator that allows startup companies to obtain low cost space and share meetings rooms. *Human resources development* expands the skilled workforce, possibly through customized worker training. Finally, *community development* utilizes NGOs, CBOs, and local firms that will hire current residents of the community whose household incomes are below the poverty

level. For example, a comprehensive program for developing small businesses, affordable housing, community health clinics, and inexpensive child care can help to eliminate some of what new businesses might consider to be one of the risks of relocating to the community.

Developing a Recovery Operations Plan

As was the case with emergency response, the demands of disaster recovery imply that specific functions be performed. Table 11-6 identifies four principal disaster recovery functions—disaster assessment, short term recovery, long term reconstruction, and recovery management. The recovery phase’s disaster assessment function should be integrated with the emergency response phase’s emergency assessment function in identifying the physical impacts of the disaster. Short term recovery focuses on the immediate tasks of securing the impact area, housing victims, and establishing conditions under which households and businesses can begin the process of recovery. Long term reconstruction actually implements the reconstruction of the disaster impact area and manages the disaster’s psychological, demographic, economic, and political impacts. Finally, recovery management monitors the performance of the disaster assessment, short term recovery, and long term reconstruction functions. It also ensures they are coordinated and provides the resources needed to accomplish them. The following section describes each of these functions in greater detail.

Table 11-6. Disaster Recovery Functions.

<i>Disaster Assessment</i>	
<ul style="list-style-type: none"> • Rapid assessment • Preliminary damage assessment • Site assessment 	<ul style="list-style-type: none"> • Victims’ needs assessments • “Lessons learned”
<i>Short Term Recovery</i>	
<ul style="list-style-type: none"> • Impact area security • Temporary shelter/housing • Infrastructure restoration • Debris management 	<ul style="list-style-type: none"> • Emergency demolition • Repair permitting • Donations management • Disaster assistance
<i>Long Term Reconstruction</i>	
<ul style="list-style-type: none"> • Hazard source control and area protection • Land use practices • Building construction practices • Public health/mental health recovery • Economic development 	<ul style="list-style-type: none"> • Infrastructure resilience • Historic preservation • Environmental recovery • Disaster memorialization
<i>Recovery Management</i>	
<ul style="list-style-type: none"> • Agency notification and mobilization • Mobilization of recovery facilities and equipment • Internal direction and control • External coordination 	<ul style="list-style-type: none"> • Public information • Recovery legal authority and financing • Administrative and logistical support • Documentation

Disaster Assessment

Disaster assessment includes both physical and social impact assessment. Physical impact assessment, which is usually called *damage assessment*, must address residential, commercial, and industrial buildings. In addition, there is a need to conduct damage assessment for infrastructure such as water, sewer, electric power, fuel, transportation, and telecommunications systems. Finally, damage assessment also must address critical facilities such as hospitals, police stations, and fire stations. In

addition, there is a need for social impact assessment, usually called victims' needs assessment to assure that the available recovery programs are meeting victims' needs. Finally, "lessons learned" examines the disaster's physical and social impacts to identify ways in which the mitigation actions can be taken to reduce the community's hazard vulnerability.


Damage assessment. There are three basic types of damage assessment (FEMA, 1995c). The first type, *rapid assessment*, is usually conducted during the emergency response, preferably within the first 24 hours (Schwab, et al., 1998). The purpose of rapid assessment is to identify the areas affected by the disaster and the approximate magnitude of the disaster's physical impacts. It is especially important to assess the need for lifesaving activities very quickly, so rapid assessment should be completed within one to three hours after disaster impact. In turn, this allows emergency managers to determine where there are collapsed buildings requiring search and rescue operations and whether there is a potential for secondary impacts such as hazmat releases after an earthquake. Rapid assessment also provides information about the status of infrastructure and critical facilities, as well as whether there is likely to be a need for assistance from other local jurisdictions or other levels of government. A rapid assessment is performed by available police, fire, and public works personnel—both on shift and recalled to duty—to conduct assessments in predetermined geographic sectors of the community. Supplementary data can be provided for a rapid assessment from the private sector organizations that own or operate lifelines and critical facilities.

The second type of assessment is the *preliminary damage assessment*, which is designed to produce counts of destroyed, severely damaged, moderately damaged, and slightly damaged structures. This level of assessment should be completed within a 3-4 days, depending on the size and accessibility of the impact area and the number and prior training of the damage assessment teams. The data from the preliminary damage assessment are used to support requests for state and federal disaster declarations. A preliminary damage assessment is performed by having local government personnel perform *windshield surveys* by driving along all of the streets in the impact area (as the name suggests, they do not get out of their cars). Inspectors tally counts of damaged structures, with residential structures being classified by income levels and structural categories (single family, mobile home, multifamily residential structures). Buildings can then be tagged red, yellow, or green depending on the level of damage and occupant safety, with red tagged buildings being unsuitable for occupancy. A preliminary damage assessment should also include estimates of percentages of households with insurance coverage because this will affect the speed with which affected individuals and communities are able to replace their housing.

Finally, a *site assessment* is meant to produce detailed estimates of the cost to repair or replace each affected structure. This information is used to support requests for federal assistance to the owners of the damaged property. It includes estimates of losses to residential properties in order to understand both the level of need for temporary shelter and temporary housing and for repair assistance. Losses to commercial and industrial structures are assessed in order to understand the level of need for repair assistance and economic injury assistance. Losses to public property must be assessed in order for the community to apply for repair assistance. Site assessments require technically trained personnel such as architects, structural engineers, and building inspectors for multistory structures such as apartment buildings. These personnel can usually be drawn from city staff, but additional personnel might be recruited from other local organizations or obtained from outside the community (e.g., through mutual aid agreements with other jurisdictions or memoranda of agreement with professional societies). Skilled construction professionals can be supplemented by volunteers who can conduct site assessments for most

single family residences if they have been trained in the use of well designed checklists. A site assessment might take weeks to complete, depending on the size and accessibility of the impact area as well as the number and training level of the assessment personnel. These methods of damage assessment can be compared to the procedures of cost estimation that are used in routine construction projects, as shown in Table 11-7.

Table 11-7. Types of Postdisaster Damage Assessments.

Damage Assessment	Routine Construction Cost Estimation
Rapid Damage Assessment	
Preliminary Damage Assessment	
Site Assessment	
	Preliminary Cost Estimate
	Detailed Cost Estimate

In preparing for the necessary damage assessments, staff from local government departments should be assigned to Damage Assessment Teams (DATs). Their numbers should be augmented as needed by staff from local private sector organizations and neighboring jurisdictions through memoranda of agreement (MOAs) or other contractual arrangements. All DAT members should be trained in a common assessment procedure in order to speed up the process and generate results that are comparable across all DATs within the jurisdiction.

Victims' needs assessment. The effects of disasters are not confined to physical damage. In addition, affected communities must assess the needs of those individuals and groups who have lost property, been injured, or lost family members. This procedure, called a *victims' needs assessment*, should begin during the preimpact recovery planning process. The first step is to identify the community's vulnerable segments, which may be defined as specific locations and neighborhoods, or types of households and businesses. The local jurisdiction should assign staff to Victims' Needs Assessment Teams (VNATs) and supplement them with staff from other organizations. These supplementary staff should be assigned by contract with NGOs and CBOs and trained together with the government staff in methods of victims' needs assessment.

The need for public assistance to finance household and business recovery is inversely related to the savings rate. That is, the lower the savings rate, the higher the need for public assistance. Unfortunately, the savings rate in the US has been extremely low for the past decade, so the VNATs should be prepared to find large numbers of households and businesses needing recovery assistance. In addition to housing needs, VNATs should also be prepared to identify households' needs for employment and other economic assistance (e.g., food, clothing, and other basic needs), as well as their psychological needs. If they are given adequate preimpact training, VNAT team members will be knowledgeable about the availability of local, state, federal, and NGO disaster recovery programs. In turn, this will enable them to accurately diagnose victims' needs and refer them to the appropriate recovery programs.

"Lessons learned". Unless the Recovery/Mitigation Committee establishes evaluation procedures, few lessons are likely to be learned and applied to improving the community's resilience. Therefore, it should establish a "Lessons Learned" subcommittee, procedures for studying the event, and a well defined scope for its report. The recovery team should use the damage assessment as an opportunity to determine what are the ways, if any, that the jurisdiction should modify its land use plan, building code, and other community operations in the light of the disaster impact. Other issues to be considered should include infrastructure location and replacement, the capital improvements program,

and the provisions of the ROP itself. The delivery date of the report should be set fairly early in the recovery process, perhaps 30 days after the disaster, so its recommendations can be incorporated into the recovery process. This should be an adequate amount of time to collect data, deliberate the implications, and make recommendations for policy revision if the jurisdiction has declared a 30 day moratorium on reconstruction.

Short Term Recovery

Impact area security and reentry. First, there is a need to maintain security in the impact area to ensure residents do not return before it is safe to do so and also to protect vulnerable property from the threat of looting. Addressing these issues requires jurisdictions to develop procedures for residents' reentry. Unfortunately, there is little research on ending evacuations to guide the planning process (Stallings, 1991), but there is anecdotal evidence of problems that have arisen after disasters. The available evidence indicates a need to provide for temporary reentry to remove essential items (e.g., clothing and medications) and permanent reentry for continuous habitation. In both cases, hazardous conditions must have abated sufficiently to allow people to enter safely. In some cases, hazard abatement might include the demolition of severely damaged buildings and the removal of heavy debris. In addition, proper identification listing a local address is needed to ensure only residents or authorized reconstruction personnel are allowed to enter. Finally, a jurisdiction must establish basic habitability criteria, such as the restoration of transportation and sewer systems. It is possible to allow people to return before electric power is available because some people have their own generators, but the criteria should be established ahead of time. If the disaster has had a regional impact, reentry should be coordinated with neighboring jurisdictions.

Temporary population shelter/housing. As indicated in the discussion of households' housing recovery, victims first find temporary shelter in the homes of friends and relatives, commercial facilities such as hotels and motels, or mass care facilities such as auditoriums and gymnasiums. The evidence is clear that the majority of evacuees prefer the homes of friends and relatives. Among those whose friends and relatives are either too far away or are themselves victims, the more affluent choose commercial facilities and the poor—usually 10-25% of the evacuees—stay in mass care facilities (Mileti, et al., 1992).

Mass care facilities must accommodate differences due to age (elderly and children), ethnicity, and physical limitations (e.g., mobility). Such facilities make it difficult to accommodate household differences in such behaviors as personal sanitation, privacy, child rearing, and hours and loudness of social interaction. They also place increased demands on time for other tasks, which reduces time for child care, resulting in loss of control over children. Lack of personal space and privacy consistently generate ethnic and class tensions among those in mass shelters and closely spaced semiprivate shelters such as tents (Yelvington, 1997). Operation of mass care facilities can be especially complex after major disasters in urban areas. In such cases, there will be a need for a large contingent of local multilingual volunteers to assist in multiethnic communities and enough people to provide continued staffing for a long duration displacement. Emergency managers can expect thousands of volunteers in first few weeks, but there are likely to be dramatic drops in volunteerism after the second week (Yelvington, 1997). Crowding and stress make it important to maintain transparency in making decisions about facility operation and to establish procedures for coping with predisaster homeless, construction workers, and others who do not qualify for shelter and housing (Bolin, 1993).

The incentives for moving from temporary shelter to temporary housing should be obvious. "Doubling up" with friends and relatives eventually causes friction in interpersonal relationships,

commercial facilities are a drain on family finances, and mass care facilities are crowded, noisy, and lack the privacy to which people are accustomed. When the number of displaced households is less than the vacancy rate for affordable housing within commuting time of jobs, the existing housing market can accommodate the relocation. To the degree that there are few vacancies, the rental rates are high, or the commuting time is excessive (either because of the travel distance or because crowded routes decrease average driving speed), government is likely to be called upon to increase the stock of temporary housing by bringing in mobile homes.

The ROP should recognize that the need for temporary housing increases in importance as the size of the socially vulnerable population increases, especially when there is a limited amount of affordable housing outside the impact area. The number of displaced households will be compounded by those evicted from undamaged homes because they lost their jobs and could not make rental or mortgage payments. In a major urban area struck by a large scope disaster, this could be thousands of mobile homes. Where will these be located—on victims' lots (utilities already installed, maintains neighborhood integrity, allows supervision of reconstruction) or in mobile home parks? If trailer parks are established, local officials should try to reduce social friction by locating people within kin and friendship networks to the greatest extent possible.

Temporary business operation. Just as households need temporary housing, so too do businesses need temporary operating locations when their normal locations have been severely damaged or destroyed. Many small businesses have customers who are loyal enough to travel an extra distance, but loyalty does have its limits. Consequently, government might need to permit the establishment of temporary business operations in parking lots or other open spaces that are close to the displaced businesses' normal locations. The ROP should also identify sites for temporary housing and temporary business operations, which may be needed for as much as a year (and even longer in some cases).

Infrastructure restoration. There are often many households and businesses that cannot resume normal functioning simply because of the lack of potable water, sewer, electric power, fuel, telecommunications, or transportation—not because of damage to their homes or places of business. Consequently, there is a need to inspect and repair any damage to pipelines and power lines, as well as streets, bridges, street signs, and street lights. In addition to returning these households and businesses to normal functioning, restoration of infrastructure to these areas also provides places where emergency workers and construction crews can live while they are rebuilding the structures that have been damaged or destroyed. On the other hand, generating a rapid economic recovery might suggest a different set of priorities—emphasizing the restoration of infrastructure for the area's dominant export industries. Thus, there are likely to be conflicting priorities and few easy decisions. Consequently, priorities must be established in the preimpact recovery plan with links to the damage assessment procedures that allow the recovery managers to adapt the predetermined infrastructure restoration priorities to the needs of each specific situation.

Critical facility operation. It should be quite obvious that there will be a need to quickly repair critical facilities such as hospitals, police stations, and fire stations. However, a community's public infrastructure is also served by other critical facilities such as water treatment plants, transit bus barns, public works equipment yards, and government offices. There is also privately operated infrastructure that includes electric power stations, television and radio facilities (both stations and broadcast towers), and telephone switching facilities. An inventory of these facilities should be available from the hazard/vulnerability analysis.

Debris management. Most of the natural disasters, and explosions among the technological disasters, can destroy a substantial number of structures. In turn, this can produce an enormous amount of debris that must be removed. Debris management should designate temporary sites for sorting recyclable from nonrecyclable materials, with the latter being moved to permanent sites for disposal. Debris management is complicated in situations where evidence must be gathered in a systematic manner as in investigations of accidents (e.g., National Transportation Safety Board investigations of airline crashes or train derailments) or when the site is to be considered a possible crime scene (e.g., the bombing of the Murrah Federal building Oklahoma City). In such cases, debris removal is likely to be delayed, so temporary sorting sites will be needed to separate out material evidence from useless debris. Ultimately, a catastrophic event such as the World Trade Center collapse or Hurricane Katrina can produce millions of tons of debris that can overwhelm landfill capacity.

Emergency demolition. It is likely that some structures will be damaged severely enough to pose a threat of collapse, so procedures are needed to rapidly assess their stability and determine if they should be reinforced and rebuilt or demolished. This assessment clearly requires competent structural engineering assistance, but historic preservationists should also be consulted if the building has cultural significance (Donaldson, 1998). Indeed, historic structures should be surveyed and inventoried before disaster strikes and postimpact damage assessment procedures should be developed to avoid unnecessary demolition of damaged historic structures (Kariotis, 1998; Kimmelman, 1998). The ROP should establish policies that include criteria for emergency demolition of severely damaged structures and adequate notification for owners who might have evacuated. In addition, the implementing procedures should contain samples of the contracts to be signed with demolition companies. These contracts require the involvement of the jurisdiction's legal counsel to ensure the administrative process respects personal property rights.

Repair permitting. The ROP should contain criteria for determining which structures will be eligible for reoccupancy based upon the percent damage to the different elements of the building—foundation, wall, and roof systems, exterior walls, interior walls, floors and flooring materials, plumbing, electrical systems, HVAC systems. The large number of requests for building repair permits following a disaster can overwhelm a local code enforcement department (Schwab, et al., 1998). In preparation for this eventuality, the permit office staff should be augmented with staff from other jurisdictions and the private sector as needed. In addition, the ROP should establish an emergency permitting process that includes 10 day moratorium on minor repairs and a 30 day moratorium on permits for substantial repairs involving 50% or more of the preimpact property assessment. This allows time for the city to acquire enough staff to evaluate the properties and areas involved and establish policies for improving the building stock as needed. Of course, exemptions may be needed for reconstruction of critical facilities. The process should be streamlined as much as possible by, for example, placing permit staff in a DAC. The streamlined process should be continued for a limited time period, often 90 days after impact, that has been defined in the ROP. Local jurisdictions should consider deferring application fees during this period.

ROPs for urban areas should anticipate the possibility of developers purchasing many damaged single family residences in the expectation of replacing them with apartment buildings. To avoid this problem, one city established a five month moratorium on applications for construction of new apartments. It also established restrictions on new buildings to ensure a Design Review Board could

exclude building designs that were incompatible with the character of the neighborhoods in which they were to be constructed.

Donations management. Major disasters frequently produce an outpouring of material (rather than financial) assistance from households and businesses outside the impact area. There is usually a substantial amount of useful material in these donations, but there also is a substantial amount of junk. Dynes (1970) and others have listed donations such as women's formal gowns, parkas (after summer disasters in the South), outdated medicines, and other items that impede the recovery by diverting personnel to the task of sorting through the donations. Even useful items must be sorted. For example, donated clothing must be sorted by category, gender appropriateness, and size. It is common for victims to reject food donations because these items are incompatible with local tastes and to refuse specific types of temporary housing because the buildings are incompatible with local cultural preferences or climatic conditions. Another problem with donations is that an influx of useful material resources precludes the need to buy from local businesses, thus threatening their revenues. Thus, in most cases, financial donations are preferable to material donations. Since material donations will inevitably arrive, local emergency managers need procedures to manage them. One important component of a donations management procedure is to establish a staging area outside the impact area where incoming donations can be received, sorted, and prepared for delivery to locations where they will be made available to disaster victims.

Disaster assistance. Under normal circumstances, people rarely need to visit government agencies. Moreover, when they do make these visits, they only need to visit one agency. During disaster recovery, however, people often need to contact multiple agencies within a short period of time. Moreover, the large number of other people attempting to visit each of those agencies and the small number of staff available to process the contacts results in long lines. In some disasters, these problems have been compounded by the periodic movement of agencies field offices from one location to another during the course of the disaster recovery. Consequently, it is important for local emergency managers to provide "one-stop shopping" so victims can resolve all of their needs at a single location that is maintained throughout the short term recovery period. It is also important that the location be readily accessible by public transportation and that additional staff be recruited and trained to minimize victims' processing delays. The ROP should also designate DAC sites that are capable of housing financial aid assistance (including grants, loans, and tax deductions/deferrals), in-kind assistance (food, clothes, bedding), and legal and technical assistance. The ROP should identify primary and augmentation staff for all of these sites, including the donations management, debris sorting, debris disposal sites, and the DACs.

Long Term Reconstruction

As Chapter 3 indicated, a disaster usually opens a window of opportunity for changes in environmental hazard management policy (Prater & Lindell, 2000). If the Recovery/Mitigation Committee has "done its homework", it will already have assessed the community's hazard exposure, physical vulnerability, and social vulnerability. In addition, it will be well prepared with suggestions for ways in which to reduce future risks by integrating hazard mitigation into disaster recovery (Schwab, et al., 1998; Wu & Lindell, 2004). Finally, the committee should identify sources of funding for the mitigation projects they propose.

Hazard source control and area protection. The Recovery/Mitigation Committee should have begun to examine the prospects for hazard source control and area protection before a disaster strikes and

continue this effort in the immediate aftermath. As indicated in Chapter 7, these mitigation strategies are not feasible for some hazards. The committee should anticipate induced growth in the protected area if hazard source control or area protection measures are implemented. However, linking the new source control or area protection measures to changes in the land use and building construction practices within the affected areas can avoid the expected increase in future vulnerability.

Land use practices. Implementation of long term reconstruction planning means setting in motion any changes in land use policies that were developed during the preimpact recovery planning process. This is also an opportune time to reexamine the community's existing land use plans and to pass new ordinances that will reduce hazard exposure. Alternative land uses can reduce the total population and property at risk, sometimes by reducing development in high hazard areas. This can be accomplished by purchasing private property, purchasing development rights, relocating public facilities and other infrastructure away from hazardous areas, and redirecting new capital improvements away from hazardous areas. Road width and access regulations might also need to be established or revised at this stage. Lot restrictions can be used to reduce population densities by downzoning and setbacks can be used to maximize distances from hazards. Landscaping and vegetation requirements can be established to reduce the potential for flooding, landslides, or fires. Moreover, as discussed in Chapter 7, the ROP should provide guidance on the reconstruction of *nonconforming uses*, which are structures that do not meet the zoning requirements for their geographic areas. Usually these are older structures whose construction preceded the establishment of the current zoning requirements and, thus, are "grandfathered".

Building construction practices. The ROP should also address the implementation of new mitigation requirements such as elevating structures located in floodplains. Other building codes can also reduce the physical impact of a disaster on structures located in risk areas. These include increasing disaster resistance of the building structure and increasing the resistance of "soft spots" in the structure. In addition to addressing new code requirements, the ROP should also address the building construction process. In particular, virtually every disaster produces complaints about out of area building contractors who receive advance payment for work that never performed. Thus, the ROP should address the need to monitor them—especially by registering out-of-area contractors and providing contract advice to owners of damaged property. Care should be taken to ensure regulation of outside contractors and construction workers does not impede the ability of NGOs such as Habitat for Humanity to use volunteer labor from out of the area to assist in the reconstruction effort. The ROP needs to balance the legitimate interests of local contractors against the needs of the community for rapid provision of affordable housing for low income residents (Peacock & Ragsdale, 1997).

Public health/mental health recovery. Most natural disasters in the US have had minimal public health consequences because the country has few endemic diseases whose incidence is likely to increase after a disaster. Contrary to many people's beliefs, dead bodies are a public health threat only if those who died had communicable diseases when they were alive. Death itself does not spontaneously generate disease. Waterborne illnesses are a problem if survivors drink from, wash food in, or bathe in water sources that have been contaminated by raw sewage or chemical spills. Of course, such exposures can be avoided by having survivors use bottled water or by evacuating the impact area until infrastructure has been restored. Disease vectors other than ingestion must also be controlled in areas where pests harbor diseases. For example, mosquito control has become increasingly important as mosquito transmitted diseases, such as West Nile virus, have become increasingly prevalent.

Similarly, natural disasters produce minimal mental health consequences. Clinical psychologists found nearly 20 years ago that few victims use formal psychological services in the aftermath of disaster (Gist & Stolz, 1982). Since that time, an extensive research has confirmed that finding (Salzer & Bickman, 1999). This has led many psychologists examine the typical problems victims face and, in so doing, found that the two most prominent are material resource loss (Freedy, et al., 1992) and disruption of social networks (Kaniasty & Norris, 1995). The first of these problems, material resource loss, is addressed by the programs for housing and economic recovery. However, mental health professionals can facilitate the recovery process by acting as victim advocates, especially for victims who are unaccustomed to working with white collar bureaucracies (Salzer & Bickman, 1999). Other recommendations include designing community interventions to provide social support by establishing victim locator systems, facilitating self-help groups, and community organizing (Salzer & Bickman, 1999)

Nonetheless, others have concluded that the failure to seek formal psychological counseling is a potential threat to the mental health of victims and even first responders. In connection with the latter, Mitchell (1983) developed a system called the *Critical Incident Stress Debriefing*, which involves preincident training, individual crisis support, demobilization (e.g., informational debriefings as personnel rotate off duty), defusing (small group discussions about the emotional significance of the event), family support, and referral to other support services (e.g., psychiatric, psychological, legal, career). Despite its proponents claims of empirical support for this method, the most rigorous scientific evaluations have found no evidence of its effectiveness (McNally, Bryant & Ehlers, 2003). One problem seems to be that establishing a rigid schedule for victims to discuss traumatic events disrupts their ability to control the alternation between psychological phases of active processing and avoidance (Pennebaker & Harber, 1993). A related problem is the requirement for group discussion with their professional peers shortly after the event (usually within 12 hours). In the case of emergency responders, this conflicts with their preference for seeking support from spouses and others outside the workplace (Gist, et al., 1999). Thus, there appears to be no scientific justification to plan for anything other than routine referrals for psychological distress.

Economic development. The ROP should provide guidance on the economic development of the disaster stricken areas. The basic strategy for redevelopment should have been planned during the process of envisioning the community recovery strategy. Thus, this is the time at which the strategy is implemented. In communities that are highly dependent on tourism, active promotion is needed to assure prospective visitors that all facilities are back in operation.

Infrastructure resilience. One opportunity that is likely to arise during disaster recovery is an opportunity to decrease the physical vulnerability of community infrastructure. In most cases, roads and bridges can be strengthened. Similarly, aboveground lines can be undergrounded to reduce their vulnerability to wind and ice. In some cases, pipelines for water, sewer, and fuel and major transmission lines for electric power and telephone can be rerouted to reduce vulnerability. However, most of these lifelines must pass through high hazard exposure areas at some point. For example, all lifelines must cross seismic faults to serve customers on the other side. All of these lifelines are critical to a community's disaster resilience, so preimpact planning or postimpact improvisation should provide for rerouting and strengthening infrastructure to decrease its vulnerability to future disasters.

Historic preservation. The disaster recovery period is an opportune time to examine the physical vulnerability of undamaged historic structures to determine how to protect them from future disasters (Cliver, 1998). The federal government has funds, as do many states, for the preservation of historic

buildings. However, the affected community must initiate the process by recognizing the value of these structures and investing time and money into their preservation (Alfaro, 1998).

Environmental remediation. Hazmat spills are an increasing problem during natural disasters and the process of cleaning up oil and chemical spills could take months (Lindell & Perry, 1997b; Showalter & Myers, 1994). In most cases, such work will be performed by specialized contractors hired by state or federal government. However, such efforts should be coordinated with local personnel from the department of public health, land use planning, or fire/hazmat response.

Disaster memorialization. Disaster recovery is a critical time in the life of a community. In the case of major loss of life or of major damage to a community's stock of historic buildings, the sense of loss can be tremendous. Communities frequently derive some collective solace from the establishment of a memorial structure or for the definition of a memorial day to be commemorated annually. These disaster memorials can play an important part in the recovery of a community's sense of identity and pride. Thus, they should be considered when a community has suffered a traumatic event. They must be planned and developed in a carefully designed, transparent, and participatory process in order to be effective instruments of community healing. In most disasters, the Recovery/Mitigation Committee should seek representation from a wide range of religious and secular groups. In some cases, the 9/11 World Trade Center attack being one of many examples, a committee of victims' families has exerted substantial influence on the memorialization process.

Recovery Management

Agency notification and mobilization. Unlike the incident management function performed during emergency response, the recovery management function performed during the disaster recovery does not require special procedures for agency notification and mobilization because agencies will be well aware of the disaster by the time recovery is initiated. The rapid assessment noted earlier might seem like a counterexample, but this task is actually part of the emergency response.

Mobilization of recovery facilities and equipment. Recovery management does require the mobilization of recovery facilities for donations management, debris management, and disaster assistance (the DACs). As noted earlier, a community with a large population of displaced victims and a small housing vacancy rate might need to develop one or more mobile home parks to provide enough temporary housing. Rapid mobilization of such facilities requires preimpact screening to identify appropriate sites. Site selection criteria should, of course, include suitable zoning and access to utilities such as water/sewer, fuel and electricity. In addition, planners should also focus on sites that have access to public transportation and close proximity to the types of jobs that will be held by a low income population.

Internal direction and control. There is a need for internal direction and control among agencies within the jurisdiction because many aspects of the recovery process require multiagency coordination. Disaster recovery typically involves local government agencies in tasks that are more like their normal duties than is the case for the emergency response. Thus, the ROP's allocation of recovery functions to agencies will be relatively simple. In addition, disaster recovery does not require an equivalent to the Incident Commander who oversees the emergency response. Instead, different departments will usually be coordinated by the Recovery/Mitigation Committee. Finally, there is less time pressure during the disaster recovery than during the emergency response, so this committee's meetings can be scheduled for daily or, later, weekly frequency. Nonetheless, decisions about recovery programs must often be made while victims still focused on satisfying basic needs such as food and shelter. Thus, recovery decisions may need to be made before citizens are ready to participate in a planning process (Smith, 2004).

External coordination. There is a need for external coordination, especially in presidentially declared disasters, because of the presence of personnel from other jurisdictions and other levels of government. As is the case for internal direction and control, there should be a relatively clear understanding of which agencies will address each disaster response function. In addition, local agencies need to understand what are the restrictions associated with different state, federal, NGO, and CBO programs.

Public information. There is also a need for public information, especially to inform disaster victims about recovery policies and procedures. However, there is also a need to inform other citizens about the progress of the recovery. Thus, the ROP should describe the procedure for disseminating public information during disaster recovery. The procedure should describe which agencies will be the source of each type of information, what will be the general content of their messages, and what communication channels they will use. As indicated in Chapter 4, general information about the recovery process and sources of additional information can be distributed through the mass media. Brochures can be targeted at individuals and organizations located in vulnerable zones (before a disaster strikes) or impact areas (after a disaster strikes). Telephone hotlines can be useful for answering questions about the recovery process, and a full time PIO should be on staff at the DAC during short term recovery. Public meetings should be held frequently to involve community residents in the reconstruction planning process.

Research on disaster recovery has reported that some victims believe there is favoritism toward business interests at the expense of households. Similar concerns have arisen in other disasters where historic preservation, neighborhood, and ethnic organizations mobilized public demonstrations, pressured administrators in hearings, and filed lawsuits (Bolin, 1993). These organizations can slow recovery and make it more expensive (Bolin, 1993) unless there is a transparent process as well as clear and consistent answers to questions such as “Who is eligible for assistance?” and “How will land use change in the impact area and how will this affect adjacent areas?”

Recovery legal authority and financing. The Recovery/Mitigation Committee needs to obtain legal authority for a wide range of short term recovery actions including a development moratorium, temporary repair permits, demolition regulations, and zoning for temporary housing (Schwab, et al., 1998). They also need to explore the feasibility of an *adequate public facility ordinance* requiring developers to pay for extending infrastructure to locations where it does not already exist, *increased participation in the National Flood Insurance Program*, and revising *annexation procedures* for incorporating additional land. In addition, the Recovery/Mitigation Committee should examine the adequacy of existing zoning tools including *development density controls* that limit the number of lots per acre of developed land, *overlay districts* that add special restrictions to the customary limitations of type (residential, commercial, and industrial) of construction, and *setback requirements* for minimum distances from hazardous terrain or landscape features. In addition to ensuring adequate legal authority, the Recovery/Mitigation Committee must identify financial tools for achieving mitigation objectives. Financing can be obtained by *directing Community Development Block Grant funds* to mitigation activities, *establishing special assessment districts*, and *charging impact fees* for new development—especially when it is in a hazard prone area.

Administrative and logistical support. During the recovery period, the pace of operations decreases so the management of specific emergency response and recovery functions does not need to be focused at incident scenes or centralized in the EOC. Thus, the activities performed by the Planning, Logistics, and Administration Sections within the IMS are gradually dispersed back to the jurisdiction’s

normal departments listed in Figure 11-2. Nonetheless, special provisions are required to support the additional staff generated by obtaining mutual aid personnel from other jurisdictions and volunteer personnel such as architects and engineers used as building inspectors. Moreover, records accumulated by the Finance Section must be available to provide a justification for expenditures on disaster recovery and hazard mitigation that are reimbursable by state and federal agencies.

Documentation. As is the case in the emergency response, documentation is needed during disaster recovery to provide the basis for organizational learning. Maintaining an event log of who took what actions in response to what conditions will provide the Recovery/ Mitigation Committee with the information it needs to produce the “Lessons Learned” document and, later, to revise the ROP. In addition, detailed documentation provides the jurisdiction’s legal counsel with the information that might be needed to defend against any lawsuits.

Case Study: Disaster Recovery in Wichita Falls

An F-4 tornado struck Wichita Falls on April 10, 1979 that killed 46 people and injured another 3245 (Bolin, 1982). The tornado also destroyed 2500 homes, seriously damaged 879, and slightly damaged 1659. In addition, it destroyed 1274 apartment units, 85 mobile homes, and 81 businesses. In the aftermath of the storm, nearly one fifth of the city’s population of 100,000 was homeless. Temporary housing began to be delivered after four days, telephone service was restored after nine days, and debris clearance from private lots had begun within two weeks. Although the EOC was deactivated five days after the storm, the emergency declaration was not lifted for a month. By that time, basic services (water, sewer, electric power, fuel, telecommunications, and transportation) were restored. Debris clearance was delayed by the need to obtain permission from property owners who were, understandably, not readily accessible due to relocation elsewhere. Nearly 50% of all homeless families had temporary housing within 45 days after the storm and almost all had temporary housing within 90 days. Most major commercial businesses had resumed operations within 120 days. Housing reconstruction was delayed by Small Business Administration funding problems, some victims’ lack of insurance and inability to qualify for federal aid, and the scarcity of building contractors and building materials. Nearly 90% of the lost housing had been rebuilt by the end of two years, but there were problems in the interim. First, the influx of construction workers increased pressure on the tight housing market. Second, reconstruction in lower socioeconomic neighborhoods was only 30% at 18 months when reconstruction in higher socioeconomic neighborhoods reached 80%. The community faced a number of foreseeable recovery issues for which it was unprepared. First, the city council reversed itself twice on the issue of siting mobile homes on lots where owners were attempting to rebuild. Second, the council imposed rent and price controls, but these only delayed increases that skyrocketed as soon as they were terminated. Third, the city incurred substantial costs for rebuilding infrastructure at a time when its revenues were down because of the losses in the property tax base.